

Appendix K Predictive Crash Analysis Supporting Information

Predicted Crash Frequency Summary Tables

Table K-1: Predicted Annual Crash Frequency for all facility types within MLS Phase I South Study Area

Freeway	Facility Type	Annual	o Build Pre Crash Frec by Severity	luency	Predict	eferred Alto ted Annual Frequency by Severity	Crash	Change in Predicted Annual Crash Frequency			
		Fatal and Injury	PDO	Total	Fatal and Injury	PDO	Total	Fatal and Injury	PDO	Total	
	Freeway Segments	176.6	407.2	583.8	185.9	448.6	634.5	9.4	41.4	50.8	
I-270 &	Ramp Segments	221.3	201.8	423.1	27.9	45.2	73.2	-193.5	-156.6	-350.0	
East Spur	Managed Lanes	0.0	0.0	0.0	17.7	47.7	65.4	17.7	47.7	65.4	
& I-370	Crossroads and Ramp Terminals	115.4	170.3	285.7	116.1	175.8	291.9	0.7	5.5	6.3	
	Subtotal	513.3	779.3	1292.6	347.6	717.3	1065.0	-165.7	-62.0	-227.5	
	Freeway Segments	30.3	69.4	99.7	25.4	64.3	89.7	-4.9	-5.1	-10.0	
I-270	Ramp Segments	1.8	2.2	4.0	2.0	2.7	4.7	0.2	0.5	0.7	
West	Managed Lanes	0.0	0.0	0.0	3.8	10.3	14.1	3.8	10.3	14.1	
Spur	Crossroads and Ramp Terminals	20.8	27.5	48.4	21.5	28.1	49.6	0.6	0.6	1.2	
	Subtotal	52.9	99.1	152.1	52.7	105.4	158.1	-0.3	6.3	6.0	
	Freeway Segments	143.8	363.3	507.0	145.0	367.0	512.0	1.3	3.7	5.0	
1 40F in	Ramp Segments	15.3	15.7	31.0	13.3	15.6	28.9	-2.0	-0.1	-2.1	
I-495 in Maryland	Managed Lanes	0.0	0.0	0.0	8.0	21.6	29.6	8.0	21.6	29.6	
iviai yiailu	Crossroads and Ramp Terminals	52.8	47.5	100.4	72.2	70.5	142.7	19.4	22.9	42.4	
	Subtotal	211.9	426.5	638.4	238.5	474.7	713.2	26.7	48.1	74.9	
	Freeway Segments	35.1	89.9	125.1	38.9	98.0	137.0	3.8	8.0	11.9	
I-495 in	Ramp Segments	6.0	9.8	15.8	4.3	7.5	11.8	-1.6	-2.3	-4.0	
Virginia	Managed Lanes	2.4	6.5	8.8	3.7	10.1	13.8	1.3	3.6	4.9	
& GWMP	Crossroads and Ramp Terminals	6.0	13.2	19.3	6.4	13.4	19.9	0.4	0.2	0.6	
	Subtotal	49.5	119.4	169.0	53.3	129.0	182.5	3.9	9.5	13.4	
Stud	dy Area All Freeways Total	827.6	1424.3	2252.1	692.3	1426.4	2118.8	-135.3	2.1	-133.2	

Table K-2: Predicted Annual Crash Frequency for Freeways, Ramps, and HOT Managed Lanes (excludes ramp terminals)

Freeway	Facility Type	Annual	o Build Pre Crash Freq by Severity	luency	Predic	eferred Alte ted Annual ency (by Sev	Crash	_	n Predicted	
		Fatal and Injury	PDO	Total	Fatal and Injury	PDO	Total	Fatal and Injury	PDO	Total
	Freeway Segments	171.6	398.4	570.0	180.0	437.4	617.4	8.5	39.0	47.5
I-270 &	Ramp Segments	221.0	201.5	422.5	27.3	44.2	71.5	-193.8	-157.3	-351.1
East Spur	HOT Managed Lanes	0.0	0.0	0.0	17.7	47.7	65.4	17.7	47.7	65.4
	Subtotal	392.6	599.9	992.5	225.0	529.3	754.3	-167.6	-70.6	-238.2
1 270	Freeway Segments	30.3	69.4	99.7	25.4	64.3	89.7	-4.9	-5.1	-10.0
I-270 West	Ramp Segments	1.8	2.2	4.0	2.0	2.7	4.7	0.2	0.5	0.7
Spur	HOT Managed Lanes	0.0	0.0	0.0	3.8	10.3	14.1	3.8	10.3	14.1
Spu.	Subtotal	32.1	71.6	103.7	31.2	77.3	108.5	-0.9	5.7	4.8
	Freeway Segments	143.8	363.3	507.0	145.0	367.0	512.0	1.3	3.7	5.0
I-495 in	Ramp Segments	15.3	15.7	31.0	13.3	15.6	28.9	-2.0	-0.1	-2.1
Maryland	HOT Managed Lanes	0.0	0.0	0.0	8.0	21.6	29.6	8.0	21.6	29.6
	Subtotal	159.1	379.0	538.1	166.3	404.2	570.5	7.3	25.2	32.5
	Freeway Segments	34.2	88.2	122.4	37.9	96.0	134.0	3.7	7.8	11.6
I-495 in	Ramp Segments	6.0	9.8	15.8	4.3	7.5	11.8	-1.6	-2.3	-4.0
Virginia	HOT Managed Lanes	2.4	6.5	8.8	3.7	10.1	13.8	1.3	3.6	4.9
	Subtotal	42.6	104.4	147.0	46.0	113.6	159.6	3.4	9.1	12.5
GWMP	Freeway Segments	0.9	1.7	2.7	1.0	2.0	3.0	0.1	0.2	0.3
GWWF	Subtotal	0.9	1.7	2.7	1.0	2.0	3.0	0.1	0.2	0.3
	Freeway Segments	5.0	8.8	13.8	5.9	11.2	17.1	0.9	2.4	3.3
I-370	Ramp Segments	0.3	0.3	0.6	0.6	1.0	1.7	0.3	0.7	1.1
	Subtotal	5.3	9.1	14.4	6.6	12.2	18.8	1.3	3.2	4.4
Study Are	ea All Freeways Total	632.7	1165.7	1798.4	476.1	1138.6	1614.7	-156.6	-27.1	-183.7

Table K-3: Predicted Annual Crash Frequency for Crossroads and Adjacent Intersections (includes ramp terminals)

Freeway	Crossroad	Facility Type	2045 No	o-Build Pro Crash Fre	edicted quency	2045 Pre Predict	ferred Alto ed Annua Frequency by Severity	ernative I Crash	Cra	Change in Predicted Annual Crash Frequency (by Severity)		
			Fatal and Injury	PDO	Total	Fatal and Injury	PDO	Total	Fatal and Injury	PDO	Total	
	MD 117 W Diamond Avenue	Adjacent Intersections	0.4	1.0	1.4	0.4	1.0	1.4	0.0	0.0	0.0	
		Ramp Terminals	5.0	8.1	13.1	8.4	11.5	19.9	3.5	3.3	6.8	
	Sam Eig Highway (Direct Access to HOT Managed Lanes)	Adjacent Intersections	13.7	13.5	27.3	13.7	13.5	27.2	-0.1	0.0	-0.1	
		Ramp Terminals	40.4	42.7	22.2	40.2	42.6	22.0	0.4	0.4		
	Shady Grove Road/Omega Drive/Redland Boulevard	Adjacent Intersections	10.4	12.7	23.2	10.3	12.6	22.9	-0.1	-0.1	-0.3	
		Ramp Terminals	15.0 2.7	18.4 5.6	33.4 8.3	9.4 3.1	12.1 6.5	21.5	-5.6 0.4	-6.2 0.8	-11.9	
	W. Gude Drive (New interchange w/ Direct Access to HOT Managed Lanes)	Adjacent Intersections	0.0	0.0	0.0	3.1 1.9	3.6	9.6 5.4	1.9	3.6	1.3 5.4	
		Ramp Terminals Adjacent Intersections	7.3	15.0	22.3	7.4	15.1	22.5	0.1	0.1	0.2	
	MD 28 Montgomery Avenue	Ramp Terminals	8.2	13.5	21.7	7.4	11.5	18.6	-1.1	-2.0	-3.1	
I-270 &		Adjacent Intersections	2.8	6.3	9.1	2.9	6.4	9.3	0.1	0.1	0.2	
East Spur	MD 189 Falls Road	Ramp Terminals	0.3	1.1	1.4	0.3	0.4	1.0	0.0	-0.5	-0.5	
Lust Spui		Adjacent Intersections	2.4	5.2	7.6	2.9	6.1	9.0	0.5	0.9	1.3	
	Wootton Parkway (New interchange w/ Direct Access to HOT Managed Lanes)	Ramp Terminals	0.0	0.0	0.0	1.4	2.7	4.1	1.4	2.7	4.1	
		Adjacent Intersections	6.3	15.0	21.4	6.2	14.7	20.9	-0.1	-0.4	-0.5	
	Montrose Road	Ramp Terminals	4.0	5.3	9.3	2.9	5.0	7.8	-1.1	-0.4	-1.5	
		Adjacent Intersections	3.0	4.8	7.8	3.0	4.9	7.9	0.0	0.1	0.1	
	Rockledge Blvd	Ramp Terminals	6.5	13.3	19.8	7.1	14.4	21.5	0.7	1.1	1.7	
		Adjacent Intersections	11.6	13.7	25.3	11.8	14.1	25.9	0.2	0.4	0.6	
	MD 187 Old Georgetown Rd (at I-270)	Ramp Terminals	14.5	15.1	29.6	13.9	15.4	29.2	-0.7	0.2	-0.4	
	1-370	Ramp Terminals	1.2	2.5	3.7	2.2	4.2	6.5	1.0	1.8	2.8	
	Subtotal	namp reminals	115.4	170.3	285.7	116.1	175.8	291.9	0.7	5.5	6.3	
		Adjacent Intersections	3.0	6.2	9.2	3.8	7.5	11.3	0.7	1.3	2.1	
	Westlake Terrace (Direct Access to HOT Managed Lanes)	Ramp Terminals										
I-270 West		Adjacent Intersections	8.4	9.1	17.5	8.6	9.4	18.0	0.3	0.3	0.5	
Spur	Democracy Boulevard	Ramp Terminals	9.4	12.2	21.7	9.1	11.2	20.3	-0.4	-1.0	-1.4	
	Subtotal		20.8	27.5	48.4	21.5	28.1	49.6	0.6	0.6	1.2	
	MAD 100 Division Decid / Cabina Jahra Davilovias / Division A second a 110T Mariana d James /	Adjacent Intersections	4.9	9.7	14.6	7.0	13.2	20.2	2.0	3.5	5.6	
	MD 190 River Road / Cabin John Parkway (Direct Access to HOT Managed Lanes)	Ramp Terminals	2.8	4.1	6.9	12.6	13.3	25.9	9.8	9.2	19.0	
1.40F:m	MD 197 Old Coorgetown Bood (at 1 405)	Adjacent Intersections	9.8	9.7	19.5	9.9	9.8	19.7	0.1	0.1	0.2	
	MD 187 Old Georgetown Road (at I-495)	Ramp Terminals	23.8	13.1	36.8	31.0	23.1	54.1	7.3	10.0	17.3	
Maryland	MD 355 Rockville Pike	Adjacent Intersections	11.6	11.0	22.5	11.8	11.1	22.9	0.2	0.2	0.4	
	IVID 353 ROCKVIIIE PIKE	Ramp Terminals										
	Subtotal		52.8	47.5	100.4	72.2	70.5	142.7	19.4	22.9	42.4	
I-495 in	VA 193	Adjacent Intersections										
Virginia	*V TO	Ramp Terminals	6.0	13.2	19.3	6.4	13.4	19.9	0.4	0.2	0.6	
• II BIIII a	Subtotal		6.0	13.2	19.3	6.4	13.4	19.9	0.4	0.2	0.6	
	Study Area All Crossroads Total		195.0	258.6	453.7	216.2	287.9	504.1	21.2	29.3	50.5	

Enhanced Interchange Safety Analysis Tool Methodology Supporting Information



ISATE ROADWAY SEGMENTATION

The mainline freeway within the Study corridor is segmented per ISATe input requirements to develop roadway sections with consistent cross-sectional, roadside, ramp access, and traffic volume characteristics. Due to the length of the Study corridor, the ISATe analysis was conducted across multiple ISATe spreadsheet files that produced multiple ISATe output reports. Specifically, the Output Summary and Evaluation Site Summary reports which are included in this Appendix. The table below may be used to reference which ISATe output report to review for a specific section of freeway as well as to determine specific facility types within each analyzed freeway section.

General notes on the mainline freeway segmentation.

- Freeway segment limits include both directions of travel.
- The General Purpose (GP) lane segments run from the mid-point of the upstream interchange to the mid-point of the subject interchange. This does not apply to Sections 1, 15, and 20 which include the Speed Change Lanes for the interchanges at MD 117, VA 193 and MD 355.
- Ramp segments include the GP and HOT lane ramps within the interchange.
- Collector-distributor (CD) segments and Ramp segments (including GP and HOT lane facilities) are analyzed in ISATe within the same worksheet. Therefore, the results are combined.

Freeway	No.	Section Limits	Facility Types				
	1	MD 117 to I-370 MP 10.85 - MP 9.33	GP Segments, C-D Segments, MD 117 Interchange Ramp Segments and GP Ramp Terminals, ML Segments				
	2	I-370 to Shady Grove Road MP 9.33 - MP 8.39	GP Segments, C-D Segments, I-370 Interchange Ramp Segments, ML Segments				
	3	Shady Grove Road to Gude Drive MP 8.39 - MP 7.58	GP Segments, C-D Segments, Shady Grove Road Interchange Ramp Segments and GP Ramp Terminals, ML Segments				
ast Spur	4	Gude Drive to MD 28 MP 7.58 - MP 6.48	GP Segments, C-D Segments, Gude Drive New Interchange Ramp Segments, ML Segments				
I-270 & East Spur	5	MD 28 to MD 189 MP 6.48 - MP 5.50	GP Segments, C-D Segments, MD 28 Interchange Ramp Segments and GP Ramp Terminals, ML Segments				
	6	MD 189 to Wootton Parkway MP 5.50 - MP 4.90	GP Segments, C-D Segments, MD 189 Interchange Ramp Segments and GP Ramp Terminals, ML Segments				
	7	Wootton Parkway to Montrose Road MP 4.90 - MP 4.14	GP Segments, C-D Segments, Wootton Parkway New Interchange Ramp Segments and GP Ramp Terminals, ML Segments				
	8	Montrose Road to I-270 West Spur MP 4.14 - MP 2.67	GP Segments, C-D Segments, Montrose Road Interchange Ramp Segments and GP Ramp Terminals, ML Segments				

F	NI	Casting Limits	Facility Tongs
Freeway	No.	Section Limits	Facility Types
	9	I-270 West Spur to Rockledge Boulevard MP 2.67 - MP 1.87	GP Segments, C-D Segments, I-270 West Spur Interchange Ramp Segments and GP Ramp Terminals, ML Segments
	10	Rockledge Blvd to MD 187 MP 1.87 - MP 1.58	GP Segments, C-D Segments, Rockledge Boulevard Interchange Ramp Segments and GP Ramp Terminals, ML Segments
	11	MD 187 to I-495 MP 1.58 - MP 0.22	GP Segments, C-D Segments, MD 187 Interchange Ramp Segments and GP Ramp Terminals, ML Segments
Spur	12	I-270 Y-Split to Westlake Terrace MP 1.37 - MP 2.10	GP Segments, Westlake Terrace Interchange Ramp Segments and GP Ramp Terminals, ML Segments
-270 West Spur	13	Westlake Terrace to Democracy Boulevard MP 1.37 - MP 1.03	GP Segments, Democracy Boulevard Interchange Ramp Segments and GP Ramp Terminals, ML Segments
-7	14	Democracy Boulevard to I-495 MP 1.03 – MP 0.00	GP Segments, ML Segments
I-495 in Virginia	15	VA 193 (Southern Study Limit) to George Washington Memorial Parkway NB I-495 MP 13.72 - MP 15.06	GP Segments, C-D Segments, VA 93 Interchange Ramp Segments and GP Ramp Terminals, ML Segments
I-495 i	16	George Washington Memorial Parkway to MD-VA State Line NB I-495 MP 15.06 - MP 15.39	GP Segments, George Washington Memorial Parkway Interchange Ramp Segments, ML Segments
	17	MD-VA State Line to MD 190 MP 0.00 - MP 2.37	GP Segments, Clara Barton Parkway Interchange Ramp Segments and GP Ramp Terminals. ML Segments
Aaryland	18	MD 190 (River Road)/ Cabin John Parkway to I-270 West Spur MP 2.37 - MP 3.66	GP Segments, C-D Segments, MD 190 (River Road)/ Cabin John Parkway Interchange Ramp Segments and GP Ramp Terminals, ML Segments
I-495 in Maryland	19	I-270 West Spur to MD 187 MP 3.66 - MP 5.61	GP Segments, I-495/I-270 West Spur ML Ramp Segments, I-495/ MD 187 Interchange GP Ramp Segments and GP Ramp Terminals, ML Segments
	20	MD 187 to MD 355/I-270 MP 5.61 - MP 6.68	GP Segments, I-495/I-270/MD355 Interchange Ramp Segments, GP Ramp Terminals, ML Segments
GWMP	21	I-495 to I-495 On-Ramp GWMP MP 0.00 - MP 0.25	GP Segments



ISATE TRAFFIC VOLUME INPUT ADJUSTMENT SEGMENTS

Below are the segments where the number of lanes exceed the maximum allowable input within ISATe and therefore, the average daily traffic volume was adjusted. See section 7.6 for more details on the volume adjustment process.

I-270 No Build

- 0.97-mile section from Montrose Road to I-270 Y MP 2.67 to 3.64
- o 4.70 miles of C-D Roads along I-270 with three lanes

I-495 No Build

o 0.41-mile section from MD 190 to I-270 West Spur – MP 3.25 to 3.66

I-270 Preferred Alternative

- o 0.53-mile section from I-370 to Shady Grove Road MP 8.54 to 9.07
- o 0.42-mile section from Shady Grove Road to Gude Drive MP 7.79 to 8.21
- o 0.10-mile section from Gude Drive to MD 28 MP 6.47 to 6.57
- 0.81-mile section from MD 28 to MD 189 MP 5.66 to 6.47
- o 0.24-mile section from Montrose Road to I-270 Y MP 2.65 to 2.89
- o 0.69 miles of C-D Roads and ramps with three lanes

I-495 Preferred Alternative

- o 0.23-mile section from MD 190 to I-270 West Spur MP 3.68 to 3.91
- o 0.30 miles of C-D Roads and ramps with three lanes

Enhanced Interchange Safety Analysis Tool Output Summary & Evaluation Site Summary Reports for the No Build Scenario

	Evaluation Site Summary									
Conoral In	formation		Evaluat	ion site s	ullillary					
Project des		ISATA LO	70 from MD 117 to I-37	70 No Puil	4					
	scription.					A === + === :	l lub au			
Analyst:		TL/PK	Date:	1/31/2022		Area type:	Urban			
	of analysis:	2027	Total length of freewa	y segment	s for Study	Period (mi)	1.520			
	of analysis:	2045								
Site Desci										
Freeway S	Segments									
Number	Lanes	Study Period	Study Period Descript	tion						
		Length (mi)								
1	8	0.210	GP MP 10.85 - MP 10.64							
2	9	0.040	GP MP 10.64 - MP 10.60							
3	10	0.600	GP MP 10.60 - MP 10.00							
4	9	0.230	GP MP 10.00 - MP 9.77							
5	8	0.170	GP MP 9.77 - MP 9.60							
6	9	0.270	GP MP 9.60 - MP 9.33							
7	0	0.000	0							
8	0	0.000	0							
9	0	0.000								
			0							
10	0	0.000	0							
11	0	0.000	0							
12	0	0.000	0							
13	0	0.000	0							
14	0	0.000	0							
15	0	0.000	0							
16	0	0.000	0							
17	0	0.000	0							
18	0	0.000	0							
19	0	0.000	0							
20	0	0.000	0							
Ramp Seg	ments									
	Study Peri	od		Number	Study Peri	iod				
	Description				Descriptio					
1	NB CD MP 7.			21	0					
	NB CD MP 7.			22	0					
	NB CD MP 6.			23	0					
	NB CD MP 5.			24	0					
_	C1-1 Ramp fr			25	0					
	C1-2 Ramp fr			26	0					
_	0 1-2 (Kamp ii	OIII 1-270 ND		27	0					
	บ G6-4 Ramp fr	om MD 447+		28	0					
				29						
	G6-31 Ramp				0					
10	G6-32 Ramp	Irom IVID 117		30	0					
	0			31	0					
	0			32	0					
	0			33	0					
	0			34	0					
	0			35	0					
_	0			36	0					
	0			37	0					
	0			38	0					
19	0			39	0					
20	0			40	0					
Crossroad	Ramp Te	rminals		_	_					
Number	Config.	Control	Study Period Descript	tion						
1	D3ex	Signal	I-270 NB at MD 117							
2										
	D3en	One stop	I-270 SB at MD 117							
3	0	0	U							
4	0	0	0							
5 6	0	0	U							
- K	0	0	0							

ISATe_I-270 from MD TL/PK 2027 2045 ion Segment crash data a) 117 to I-37	put Summa '0_No Build 1/31/2022		Area type:	[U	Irban	
TL/PK 2027 2045 ion				Area type:	U	rban	
TL/PK 2027 2045 ion				Area type:	U	rban	
2027 2045 ion	Date.	170172022	,	Alca type.		i baii	
2045 ion							
ion							
Segment crash data a	المامانيين		Na	First veer s	f		
Project-level crash data available?				First year of crash data:			
•		?	No	,	Last year of crash data:		
Segment crash data a			No	First year of crash data:			
Project-level crash da		?	No	Last year of			
Segment crash data a	available?		No	First year of	f crash data:		
Project-level crash da	ita available	?	No	Last year of	f crash data:		
tistics							
acility		Total	K	Α	В	С	PDO
•	shes:	2611.7	10.3	31.7	183.0	609.8	1776.8
• •		-					93.5
							PDO
•							1283.9
Freeway segments, crashes:							
Ramp segments, crashes:							338.3
•			-				154.6
							PDO
crashes during	2027	137.5	0.5	1.7	9.6	32.1	93.5
shes:	2028	137.5	0.5	1.7	9.6	32.1	93.5
	2029	137.5	0.5	1.7	9.6	32.1	93.5
	2030	137.5	0.5	1.7	9.6	32.1	93.5
							93.5
							93.5
							93.5
							93.5
						_	
							93.5
			0.5	1.7			93.5
	2037	137.5	0.5	1.7	9.6	32.1	93.5
	2038	137.5	0.5	1.7	9.6	32.1	93.5
	2039	137.5	0.5	1.7	9.6	32.1	93.5
	2040	137.5	0.5	1.7	9.6		93.5
							93.5
							93.5
							93.5
							93.5
		137.5	0.5	1.7	9.6	32.1	93.5
	2049						
	2050						
nes for Entire Facility	/						
Oursels Trues Oct		Estimate	ed Numb	er of Crash	es During tl	ne Study I	Period
Crash Type Cat	egory	Total	K	Α	В	С	PDO
Head-on crashes:		12.9	0.1	0.3	1.5	5.1	5.9
			0.3		8.2	33.3	65.1
	+						918.8
	-						373.7
	o crachoo:						54.0
Total multiple-vehic	ie crashes:	2081.4	8.0	25.0	144.6	486.2	1417.5
Crashes with animal:		7.0	0.0	0.0	0.1	0.4	6.4
		000	47	4.8	27.6	88.8	267.5
Crashes with fixed ob	•	390.4	1.7		21.0		
	•	390.4 47.8	0.1	0.3	1.6	5.3	40.6
Crashes with fixed ob	oject:						
Crashes with fixed ob Crashes with other ob Crashes with parked	oject: vehicle:	47.8 7.8	0.1 0.0	0.3 0.1	1.6	5.3 1.6	40.6 5.6
Crashes with fixed ob Crashes with other ob	oject: vehicle: crashes	47.8	0.1	0.3 0.1 1.5	1.6 0.5	5.3	40.6
	Project-level crash datistics acility es during Study Period, craseq, during Study Period, crashes: nals, crashes: acility by Year crashes during shes: Crash Type Cat Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle	Project-level crash data available ### ### ### ### ### ### ### ### ### #	Project-level crash data available?	Project-level crash data available? No	Project-level crash data available? **Total K A** **Se during Study Period, crashes: 2611.7 10.3 31.7 **Component Nbr. Sites Total K A** **rashes: 6 1800.3 6.7 18.5 **hes: 9 562.5 3.5 10.5 **nals, crashes: 2 249.0 0.2 2.7 **sacility by Year Year Total K A** **crashes during 2027 137.5 0.5 1.7 **zoashes during 2028 137.5 0.5 1.7 **zoashes during 301 137.5 0.5 1.7 **zoashes during 3028 137.5 0.5 1.7 **zoashes during 301 137.5 0.5 1.7 **zoashes during 3029 137.5 0.5 1.7 **zoashes during 3020 137.5 0.5 1.7 **zoashes during 303 137.5 0.5 1.7 **zoashes during 3020 137.5 0.5 1.7 **zoashes during 303 137.5 0.5 1.7 **zoashes during 317.5 0.5 1.7 **zoashes dur	Project-level crash data available? No Last year of crash data: Italian Italia	Project-level crash data available? No

			Fyalua	ition Site S	ummary			
General In	formation		Lvaido	ition one o	aiiiiiai y			
Project des			70 from I-370 to Shad	v Grove Rd	No Build			
Analyst:	scription.	TL/PK	Date:	1/31/2022	_INO Dulla	Area type:	Urban	
	of analysis:	2027	Total length of freewa		e for Study		0.940	
	of analysis:	2045	Total length of freewo	ay segment	s ioi Study	renou (IIII)	0.940	
		2045						
Site Desci								
Freeway S		1	lo:			1		
Number	Lanes		Study Period Descrip	otion				
		Length (mi)						
1	9	0.060	GP MP 9.33 - MP 9.26					
2	8	0.360	GP MP 9.26 - MP 8.91					
3	8	0.210	GP MP 8.91 - MP 8.70					
4	8	0.310	GP MP 8.70 - MP 8.39					
5	0	0.000	0					
6	0	0.000	0					
7	Ő	0.000	0					
8	0	0.000	0					
9	0	0.000	0					
10	0	0.000	0					
11	0	0.000	0					
12	0	0.000	0					
13	0	0.000	0					
14	0	0.000	0					
15	0	0.000	0					
16	0	0.000	0					
17	0	0.000	0					
18	0	0.000	0					
19	0	0.000	0					
20	0	0.000	0					
Ramp Seg	ments		<u> </u>			ı		
	Study Peri	od		Number	Study Per	iod		
ramber	Description			1 dillipoi	Descriptio			
1		.66 - MP 5.59		21	n	""		
2	NB CD MP 5.			22	C7-16 Pamp	from I-370 to I		
3	NB CD MP 5.			23	-	from I-270 SB		
4	0	.41-WII 4.52		24	-	from I-370 WE		
	_	00 MD 4.74		25				
5		.92 - MP 4.74				from I-370 WE		
6	SB CD MP 0.			26		from I-370 WE		
7		26 - MP 0.45		27		from I-370 EB		
8		45 - MP 0.73		28	-	from I-370 EB		
9	SB CD MP 0.	73 - MP 0.82		29	C3-93 Ramp	from I-370 EB		
10	SB CD MP 0.			30		p from I-370 W		
11		rom I-270 NB		31	C7-151 Ram	p from I-370 W		
12	C1-6 Ramp fr	rom I-270 to I-	1	32	0			
13	C1-7 Ramp fr	rom I-270 to I-		33	0			
14	0			34	0			
15	0			35	0			
16	C4-10 Ramp	from I-270 NE		36	0			
17	-	from I-270 NE		37	0			
18		from I-270 SE		38	0			
19		from I-270 SE		39	0			
20		from I-370 EE		40	0			
	d Ramp Te		1	1 .	I -			
Number	Config.	Control	Study Period Descrip	otion				
1	0	0	0					
2	0	0	0					
3	0	0	0					
4	0	0	0					
5	0	0	0					
6	0	0	0					
U	U	U	V			1		

		Out	put Summ	ary					
General Information	1		p	<i>y</i>					
Project description:	ISATe I-270 from I-3	370 to Shady	Grove Rd	No Build					
Analyst:	TL/PK		1/31/2022	- TTO Balla	Area type:	T ₁	Urban		
First year of analysis		Date.	1/01/2022		, aca type.		O Dall		
Last year of analysis									
Crash Data Descrip			1	N.	I =: 4	f 1 1 1 1			
Freeway segments	Segment crash data			No	First year of crash data:				
	Project-level crash d		?	No	Last year of crash data:				
Ramp segments	Segment crash data			No	First year c	First year of crash data:			
	Project-level crash d	ata available	?	No	Last year o				
Ramp terminals	Segment crash data	available?		No	First year c	of crash data	a:		
•	Project-level crash d	ata available	?	No	Last year o	f crash data	a:		
Estimated Crash St	atistics								
Crashes for Entire I	acility		Total	K	Α	В	С	PDO	
	nes during Study Period, cra	sehee.	1928.0	10.6		179.6	486.1	1220.3	
	req. during Study Period, cr		101.5	0.6	1.6	9.5	25.6	64.2	
Crashes by Facility		Nbr. Sites	Total	K	Α	В	C	PDO	
			764.5						
Freeway segments, or		4		3.0	8.3	54.5	172.5	526.2	
Ramp segments, cra		27	1163.6	7.6		125.2	313.6	694.2	
Crossroad ramp term		0	0.0	0.0	0.0	0.0	0.0	0.0	
Crashes for Entire I		Year	Total	K	Α	В	С	PDO	
Estimated number of		2027	101.5	0.6	1.6	9.5	25.6	64.2	
the Study Period, cra	shes:	2028	101.5	0.6	1.6	9.5	25.6	64.2	
		2029	101.5	0.6	1.6	9.5	25.6	64.2	
		2030	101.5	0.6	1.6	9.5	25.6	64.2	
		2031	101.5	0.6		9.5	25.6	64.2	
		2032	101.5	0.6		9.5	25.6	64.2	
		2032	101.5	0.6		9.5	25.6	64.2	
		2034	101.5	0.6		9.5	25.6	64.2	
					-				
		2035	101.5	0.6		9.5	25.6	64.2	
		2036	101.5	0.6		9.5	25.6	64.2	
		2037	101.5	0.6		9.5	25.6	64.2	
		2038	101.5	0.6		9.5	25.6	64.2	
		2039	101.5	0.6	1.6	9.5	25.6	64.2	
		2040	101.5	0.6	1.6	9.5	25.6	64.2	
		2041	101.5	0.6	1.6	9.5	25.6	64.2	
		2042	101.5	0.6	1.6	9.5	25.6	64.2	
		2043	101.5	0.6		9.5	25.6	64.2	
		2044	101.5	0.6	1.6	9.5	25.6	64.2	
		2045	101.5	0.6		9.5	25.6	64.2	
		2045	101.5	0.0	1.0	9.3	20.0	04.2	
		2046							
		2048							
		2049							
		2050							
Distribution of Cras		'v							
Fetimated Number of Crashes During the Study Peri									
	hes for Entire Facilit								
Crash Type	Crash Type Ca		Total	K	Α	В	С	PDO	
Crash Type	Crash Type Ca Head-on crashes:	tegory	Total 13.2	K 0.1	A 0.3			PDO 6.0	
Crash Type	Crash Type Ca	tegory	Total	K	Α	В	С	PDO	
Crash Type	Crash Type Ca Head-on crashes:	tegory	Total 13.2	K 0.1	A 0.3	B 1.9	C 4.9	PDO 6.0	
Crash Type	Crash Type Ca Head-on crashes: Right-angle crashes:	tegory	Total 13.2 18.9	K 0.1 0.1	0.3 0.4	B 1.9 2.2	4.9 6.2	9DO 6.0 10.0 589.0	
Crash Type	Crash Type Ca Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes:	tegory	Total 13.2 18.9 993.7 382.7	0.1 0.1 6.1 1.2	0.3 0.4 18.0 3.5	1.9 2.2 102.6 20.4	4.9 6.2 277.9 56.1	9DO 6.0 10.0 589.0 301.4	
Crash Type	Crash Type Ca Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicl	tegory -	Total 13.2 18.9 993.7 382.7 127.9	0.1 0.1 6.1 1.2	0.3 0.4 18.0 3.5 2.9	1.9 2.2 102.6 20.4 15.7	4.9 6.2 277.9 56.1 40.4	9DO 6.0 10.0 589.0 301.4 68.0	
Crash Type Multiple vehicle	Crash Type Ca Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicl Total multiple-vehicl	tegory e crashes:	Total 13.2 18.9 993.7 382.7 127.9 1536.4	0.1 0.1 6.1 1.2 1.0 8.5	0.3 0.4 18.0 3.5 2.9 25.1	1.9 2.2 102.6 20.4 15.7 142.8	4.9 6.2 277.9 56.1 40.4 385.5	974.4	
Crash Type Multiple vehicle	Crash Type Ca Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicl Total multiple-vehicl Crashes with animal:	tegory e crashes: cle crashes:	Total 13.2 18.9 993.7 382.7 127.9 1536.4 3.9	0.1 0.1 6.1 1.2 1.0 8.5 0.0	0.3 0.4 18.0 3.5 2.9 25.1 0.0	8 1.9 2.2 102.6 20.4 15.7 142.8 0.1	4.9 6.2 277.9 56.1 40.4 385.5 0.3	974.4 3.4	
Crash Type Multiple vehicle	Crash Type Ca Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicl Total multiple-vehicl Crashes with animal: Crashes with fixed of	e crashes: cle crashes: bject:	Total 13.2 18.9 993.7 382.7 127.9 1536.4 3.9 293.5	0.1 0.1 6.1 1.2 1.0 8.5 0.0	0.3 0.4 18.0 3.5 2.9 25.1 0.0 4.5	B 1.9 2.2 102.6 20.4 15.7 142.8 0.1 26.4	C 4.9 6.2 277.9 56.1 40.4 385.5 0.3 72.2	974.4 188.5	
Crash Type Multiple vehicle	Crash Type Ca Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicl Total multiple-vehicl Crashes with animal: Crashes with fixed of Crashes with other of	e crashes: cle crashes: bject: bject:	Total 13.2 18.9 993.7 382.7 127.9 1536.4 3.9 293.5 27.1	0.1 0.1 6.1 1.2 1.0 8.5 0.0 1.5	A 0.3 0.4 18.0 3.5 2.9 25.1 0.0 4.5 0.2	B 1.9 2.2 102.6 20.4 15.7 142.8 0.1 26.4 1.2	C 4.9 6.2 277.9 56.1 40.4 385.5 0.3 72.2 3.5	974.4 188.9 22.1	
Crash Type Multiple vehicle	Crash Type Ca Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicl Total multiple-vehicl Crashes with animal: Crashes with fixed of Crashes with other of Crashes with parked	e crashes: cle crashes: bject: bject: vehicle:	Total 13.2 18.9 993.7 382.7 127.9 1536.4 3.9 293.5 27.1 5.4	8.5 0.1 0.0 6.1 1.2 1.0 8.5 0.0 1.5	A 0.3 0.4 18.0 3.5 2.9 25.1 0.0 4.5 0.2 0.1	B 1.9 2.2 102.6 20.4 15.7 142.8 0.1 26.4 1.2	C 4.9 6.2 277.9 56.1 40.4 385.5 0.3 72.2 3.5 1.3	974.4 188.9 22.1	
	Crash Type Ca Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicl Total multiple-vehicl Crashes with animal: Crashes with fixed of Crashes with other of	e crashes: cle crashes: bject: bject: vehicle:	Total 13.2 18.9 993.7 382.7 127.9 1536.4 3.9 293.5 27.1	0.1 0.1 6.1 1.2 1.0 8.5 0.0 1.5	A 0.3 0.4 18.0 3.5 2.9 25.1 0.0 4.5 0.2 0.1	B 1.9 2.2 102.6 20.4 15.7 142.8 0.1 26.4 1.2	C 4.9 6.2 277.9 56.1 40.4 385.5 0.3 72.2 3.5	974.4 188.5	
Crash Type Multiple vehicle	Crash Type Ca Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicl Total multiple-vehicl Crashes with animal: Crashes with fixed of Crashes with other of Crashes with parked	e crashes: cle crashes: bject: bject: vehicle: crashes	Total 13.2 18.9 993.7 382.7 127.9 1536.4 3.9 293.5 27.1 5.4	8.5 0.1 0.0 6.1 1.2 1.0 8.5 0.0 1.5	A 0.3 0.4 18.0 3.5 2.9 25.1 0.0 4.5 0.2	B 1.9 2.2 102.6 20.4 15.7 142.8 0.1 26.4 1.2	C 4.9 6.2 277.9 56.1 40.4 385.5 0.3 72.2 3.5 1.3	974.4 188.9 22.1	

Evaluation Site Summary									
General In	nformation					y			
Project des			Managed Lanes	Stud	v 2045 No	Build I-27	n from Sha	dy Grove F	Road to Gude Drive
	scription.	TL/PK	Date:		<u>y_</u> 2043 No 1/31/2022	Dulid_I-27			Urban
Analyst:	of analysis:	2027	Total length of fr			e for Study	Area type:		
		2045	Total length of h	eeway	y segment	s ioi Study	renou (IIII)	0.610)
	of analysis:	2040							
Site Desci	-								
Freeway S									
Number	Lanes	Study Period	Study Period De	escripti	ion				
		Length (mi)							
1	8	0.130	GP MP 8.39 - MP 8.3	26					
2	9	0.280	GP MP 8.26 - MP 7.						
3	9	0.400	GP MP 7.98 - MP 7.	58					
4	0	0.000	0						
5	0	0.000	0						
6	0	0.000	0						
7	0	0.000	0						
8	0	0.000	0						
9	0	0.000	0						
10	Ö	0.000	0						
11	0	0.000	0						
12	0	0.000	0						
13	0	0.000	0						
13	0	0.000	0						
	_		-						
15 16	0	0.000	0						
	0	0.000	0						
17	0	0.000	0						
18	0	0.000	0						
19	0	0.000	0						
20	0	0.000	0						
Ramp Seg									
	Study Peri				Number	Study Peri			
	Description	า							
1						Description	<u>n</u>		
	NB CD MP 4	74 - MP 4.67			21	0	n		
2	NB CD MP 4 NB CD MP 4	74 - MP 4.67			22		n		
2 3	NB CD MP 4 NB CD MP 4	74 - MP 4.67 67 - MP 4.55 55 - MP 3.92			22 23	0	n		
2 3 4	NB CD MP 4	74 - MP 4.67 67 - MP 4.55 55 - MP 3.92			22 23 24	0 0 0 0	n		
2 3 4 5	NB CD MP 4 NB CD MP 4	74 - MP 4.67 67 - MP 4.55 55 - MP 3.92 90 - MP 1.08			22 23 24 25	0 0 0	<u>n</u>		
2 3 4 5 6	NB CD MP 4. NB CD MP 4. SB CD MP 0. SB CD MP 1. SB CD MP 1.	74 - MP 4.67 67 - MP 4.55 55 - MP 3.92 90 - MP 1.08 08 - MP 1.42 42 - MP 1.68			22 23 24 25 26	0 0 0 0	n		
2 3 4 5 6 7	NB CD MP 4 NB CD MP 4 SB CD MP 0 SB CD MP 1 SB CD MP 1 C2-18 Ramp	74 - MP 4.67 67 - MP 4.55 55 - MP 3.92 90 - MP 1.08 08 - MP 1.42 42 - MP 1.68 from Shady G			22 23 24 25 26 27	0 0 0 0	n		
2 3 4 5 6 7	NB CD MP 4. NB CD MP 4. SB CD MP 0. SB CD MP 1. SB CD MP 1.	74 - MP 4.67 67 - MP 4.55 55 - MP 3.92 90 - MP 1.08 08 - MP 1.42 42 - MP 1.68 from Shady G			22 23 24 25 26 27 28	0 0 0 0 0	n		
2 3 4 5 6 7 8 9	NB CD MP 4 NB CD MP 4 SB CD MP 0 SB CD MP 1 SB CD MP 1 C2-18 Ramp	74 - MP 4.67 67 - MP 4.55 55 - MP 3.92 90 - MP 1.08 08 - MP 1.42 42 - MP 1.68 from Shady G			22 23 24 25 26 27 28 29	0 0 0 0 0 0	n		
2 3 4 5 6 7 8 9	NB CD MP 4 NB CD MP 4 SB CD MP 0. SB CD MP 1. SB CD MP 1. C2-18 Ramp C3-19 Ramp	74 - MP 4.67 67 - MP 4.55 55 - MP 3.92 90 - MP 1.08 08 - MP 1.42 42 - MP 1.68 from Shady G from Shady G			22 23 24 25 26 27 28	0 0 0 0 0 0 0	n		
2 3 4 5 6 7 8 9 10 11	NB CD MP 4 NB CD MP 4 SB CD MP 0. SB CD MP 1. SB CD MP 1. C2-18 Ramp C3-19 Ramp C4-20 Ramp C4-21 Ramp	74 - MP 4.67 67 - MP 4.55 55 - MP 3.92 90 - MP 1.08 08 - MP 1.42 42 - MP 1.68 from Shady G from Shady G			22 23 24 25 26 27 28 29	0 0 0 0 0 0 0	n		
2 3 4 5 6 7 8 9 10 11	NB CD MP 4 NB CD MP 4 SB CD MP 0. SB CD MP 1. SB CD MP 1. C2-18 Ramp C3-19 Ramp C4-20 Ramp C4-21 Ramp	74 - MP 4.67 67 - MP 4.55 55 - MP 3.92 90 - MP 1.08 08 - MP 1.42 42 - MP 1.68 from Shady G from I-270 NE from I-270 NE from Shady G			22 23 24 25 26 27 28 29 30	0 0 0 0 0 0 0 0	n		
2 3 4 5 6 7 8 9 10 11	NB CD MP 4 NB CD MP 4 SB CD MP 0 SB CD MP 1 SB CD MP 1 C2-18 Ramp C3-19 Ramp C4-20 Ramp C4-21 Ramp C6-22 Ramp C7-23 Ramp	74 - MP 4.67 67 - MP 4.55 55 - MP 3.92 90 - MP 1.08 08 - MP 1.42 42 - MP 1.68 from Shady G from I-270 NE from I-270 NE from Shady G			22 23 24 25 26 27 28 29 30 31	0 0 0 0 0 0 0 0 0	n		
2 3 4 5 6 7 8 9 10 11	NB CD MP 4 NB CD MP 4 SB CD MP 0 SB CD MP 1 SB CD MP 1 C2-18 Ramp C3-19 Ramp C4-20 Ramp C4-21 Ramp C6-22 Ramp C7-23 Ramp C8-24 Ramp	74 - MP 4.67 67 - MP 4.55 55 - MP 3.92 90 - MP 1.08 08 - MP 1.42 42 - MP 1.68 from Shady G from I-270 NE from I-270 NE from Shady G			22 23 24 25 26 27 28 29 30 31 32	0 0 0 0 0 0 0 0 0 0	n		
2 3 4 5 6 7 8 9 10 11 12 13 14	NB CD MP 4 NB CD MP 4 SB CD MP 0 SB CD MP 1 SB CD MP 1 C2-18 Ramp C3-19 Ramp C4-20 Ramp C4-21 Ramp C6-22 Ramp C7-23 Ramp C8-24 Ramp C9-25 Ramp	74 - MP 4.67 67 - MP 4.55 55 - MP 3.92 90 - MP 1.08 08 - MP 1.42 42 - MP 1.68 from Shady G from I-270 NE from Shady G from Shady G from Shady G from Shady G from I-270 SE from I-270 NE			22 23 24 25 26 27 28 29 30 31 32 33	0 0 0 0 0 0 0 0 0 0	n		
2 3 4 5 6 7 8 9 10 11 12 13 14 15	NB CD MP 4 NB CD MP 4 SB CD MP 0 SB CD MP 1 SB CD MP 1 C2-18 Ramp C3-19 Ramp C4-20 Ramp C4-21 Ramp C6-22 Ramp C7-23 Ramp C7-23 Ramp C8-24 Ramp C9-25 Ramp C10-26 Ramp	74 - MP 4.67 67 - MP 4.55 55 - MP 3.92 90 - MP 1.08 08 - MP 1.42 42 - MP 1.68 from Shady G from I-270 NE from Shady G from Shady G from Shady G from I-270 SE from I-270 SE			22 23 24 25 26 27 28 29 30 31 32 33 34 35	0 0 0 0 0 0 0 0 0 0	n		
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	NB CD MP 4 NB CD MP 4 SB CD MP 0 SB CD MP 1 SB CD MP 1 C2-18 Ramp C3-19 Ramp C4-20 Ramp C4-21 Ramp C6-22 Ramp C7-23 Ramp C7-23 Ramp C8-24 Ramp C9-25 Ramp C10-26 Ram C10-27 Ram	74 - MP 4.67 67 - MP 4.55 55 - MP 3.92 90 - MP 1.08 08 - MP 1.42 42 - MP 1.68 from Shady G from I-270 NE from Shady G from Shady G from Shady G from Shady G from I-270 SE from I-270 NE			22 23 24 25 26 27 28 29 30 31 32 33 34 35 36	0 0 0 0 0 0 0 0 0 0 0	n		
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17	NB CD MP 4 NB CD MP 4 SB CD MP 0 SB CD MP 1 SB CD MP 1 C2-18 Ramp C3-19 Ramp C4-20 Ramp C4-21 Ramp C6-22 Ramp C7-23 Ramp C8-24 Ramp C9-25 Ramp C10-26 Ram C10-27 Ram	74 - MP 4.67 67 - MP 4.55 55 - MP 3.92 90 - MP 1.08 08 - MP 1.42 42 - MP 1.68 from Shady G from I-270 NE from Shady G from Shady G from Shady G from I-270 SE from I-270 SE			22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37	0 0 0 0 0 0 0 0 0 0 0 0 0 0	n		
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	NB CD MP 4 NB CD MP 4 SB CD MP 0 SB CD MP 1 SB CD MP 1 C2-18 Ramp C3-19 Ramp C4-20 Ramp C4-21 Ramp C6-22 Ramp C7-23 Ramp C8-24 Ramp C9-25 Ramp C10-26 Ramp C10-27 Ramp 0	74 - MP 4.67 67 - MP 4.55 55 - MP 3.92 90 - MP 1.08 08 - MP 1.42 42 - MP 1.68 from Shady G from I-270 NE from Shady G from Shady G from Shady G from I-270 SE from I-270 SE			22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	n		
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19	NB CD MP 4 NB CD MP 4 SB CD MP 0 SB CD MP 1 SB CD MP 1 C2-18 Ramp C3-19 Ramp C4-20 Ramp C4-21 Ramp C6-22 Ramp C7-23 Ramp C8-24 Ramp C9-25 Ramp C10-26 Ram C10-27 Ram	74 - MP 4.67 67 - MP 4.55 55 - MP 3.92 90 - MP 1.08 08 - MP 1.42 42 - MP 1.68 from Shady G from I-270 NE from Shady G from Shady G from Shady G from I-270 SE from I-270 SE			22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39	0 0 0 0 0 0 0 0 0 0 0 0 0 0	n		
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	NB CD MP 4 NB CD MP 4 SB CD MP 0 SB CD MP 1 SB CD MP 1 SB CD MP 1 C2-18 Ramp C3-19 Ramp C4-20 Ramp C4-21 Ramp C6-22 Ramp C7-23 Ramp C8-24 Ramp C9-25 Ramp C10-26 Ramp C10-27 Ramp 0 0 0	74 - MP 4.67 67 - MP 4.55 55 - MP 3.92 90 - MP 1.08 08 - MP 1.42 42 - MP 1.68 from Shady G from I-270 NE from Shady G from Shady G from I-270 SE from I-270 SE of from I-270 S			22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	n		
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	NB CD MP 4 NB CD MP 4 SB CD MP 0 SB CD MP 1 SB CD MP 1 SB CD MP 1 C2-18 Ramp C3-19 Ramp C4-20 Ramp C4-21 Ramp C6-22 Ramp C7-23 Ramp C8-24 Ramp C9-25 Ramp C10-26 Ramp C10-27 Ramp 0 0	74 - MP 4.67 67 - MP 4.55 55 - MP 3.92 90 - MP 1.08 08 - MP 1.42 42 - MP 1.68 from Shady G from I-270 NE from Shady G from Shady G from I-270 SE from I-270 SE of from I-270 S		escripti	22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40	0 0 0 0 0 0 0 0 0 0 0 0 0 0	n		
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 Crossroad	NB CD MP 4 NB CD MP 4 SB CD MP 0 SB CD MP 1 SB CD MP 1 C2-18 Ramp C3-19 Ramp C4-20 Ramp C4-21 Ramp C6-22 Ramp C7-23 Ramp C8-24 Ramp C9-25 Ramp C10-26 Ramp C10-27 Ramp 0 0 0 0 C Ramp Te Config.	74 - MP 4.67 67 - MP 4.55 55 - MP 3.92 90 - MP 1.08 08 - MP 1.42 42 - MP 1.68 from Shady G from I-270 NE from Shady G from I-270 NE from I-270 SE from I-270 SE of from I-270 S	Study Period De		22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40	0 0 0 0 0 0 0 0 0 0 0 0 0 0	n		
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 Crossroad Number	NB CD MP 4 NB CD MP 4 SB CD MP 0 SB CD MP 1 SB CD MP 1 SB CD MP 1 C2-18 Ramp C3-19 Ramp C4-20 Ramp C4-21 Ramp C6-22 Ramp C7-23 Ramp C8-24 Ramp C9-25 Ramp C10-26 Ramp C10-27 Ramp 0 0 0 0 DRAMP Te Config.	74 - MP 4.67 67 - MP 4.55 55 - MP 3.92 90 - MP 1.08 08 - MP 1.42 42 - MP 1.68 from Shady G from I-270 NE from I-270 NE from I-270 NE of from I-270 SE	Study Period De	at I-270	22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40	0 0 0 0 0 0 0 0 0 0 0 0 0 0	n		
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 Crossroad Number	NB CD MP 4 NB CD MP 4 SB CD MP 0 SB CD MP 1 SB CD MP 1 SB CD MP 1 C2-18 Ramp C3-19 Ramp C4-20 Ramp C4-21 Ramp C6-22 Ramp C7-23 Ramp C8-24 Ramp C9-25 Ramp C10-26 Ramp C10-27 Ramp 0 0 0 0 DA Ramp Te Config. D3ex D3ex D3ex	74 - MP 4.67 67 - MP 4.55 55 - MP 3.92 90 - MP 1.08 08 - MP 1.42 42 - MP 1.68 from Shady G from I-270 NE from Shady G from I-270 NE from I-270 NE of from I-270 SE	Study Period De Shady Grove Road a Shady Grove Road a	at I-270 at I-270	22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40	0 0 0 0 0 0 0 0 0 0 0 0 0 0	n		
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 Crossroad Number	NB CD MP 4 NB CD MP 4 SB CD MP 0 SB CD MP 1 SB CD MP 1 SB CD MP 1 C2-18 Ramp C3-19 Ramp C4-20 Ramp C4-21 Ramp C6-22 Ramp C7-23 Ramp C8-24 Ramp C9-25 Ramp C10-26 Ramp C10-27 Ramp 0 0 0 0 DRAMP Te Config. D3ex D3ex D3ex D3ex	74 - MP 4.67 67 - MP 4.55 55 - MP 3.92 90 - MP 1.08 08 - MP 1.42 42 - MP 1.68 from Shady G from I-270 NE from I-270 NE from I-270 NE of from I-270 SE	Study Period De Shady Grove Road a Shady Grove Road a Omega Dr Fileds Ro	at I-270 at I-270 ad at I-2	22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40	0 0 0 0 0 0 0 0 0 0 0 0 0 0	n		
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 Crossroad Number	NB CD MP 4 NB CD MP 4 SB CD MP 0 SB CD MP 1 SB CD MP 1 SB CD MP 1 C2-18 Ramp C3-19 Ramp C4-20 Ramp C4-21 Ramp C6-22 Ramp C7-23 Ramp C8-24 Ramp C9-25 Ramp C10-26 Ramp C10-27 Ramp 0 0 0 0 DA Ramp Te Config. D3ex D3ex D3ex D3ex D3ex	74 - MP 4.67 67 - MP 4.55 55 - MP 3.92 90 - MP 1.08 08 - MP 1.42 42 - MP 1.68 from Shady G from I-270 NE from Shady G from I-270 NE from I-270 NE of from I-270 SE	Study Period De Shady Grove Road a Shady Grove Road a	at I-270 at I-270 ad at I-2	22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40	0 0 0 0 0 0 0 0 0 0 0 0 0 0	n		
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 Crossroad Number	NB CD MP 4 NB CD MP 4 SB CD MP 0 SB CD MP 1 SB CD MP 1 SB CD MP 1 C2-18 Ramp C3-19 Ramp C4-20 Ramp C4-21 Ramp C6-22 Ramp C7-23 Ramp C8-24 Ramp C9-25 Ramp C10-26 Ramp C10-27 Ramp 0 0 0 0 DRAMP Te Config. D3ex D3ex D3ex D3ex	74 - MP 4.67 67 - MP 4.55 55 - MP 3.92 90 - MP 1.08 08 - MP 1.42 42 - MP 1.68 from Shady G from I-270 NE from I-270 NE from I-270 NE of from I-270 SE	Study Period De Shady Grove Road a Shady Grove Road a Omega Dr Fileds Ro	at I-270 at I-270 ad at I-2	22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40	0 0 0 0 0 0 0 0 0 0 0 0 0 0	n		

Appendix K

		Out	put Summ	ary			
General Information			004511	D 11 1 0 7	0.1		11 0 1
Project description:	I-270 I-495 Manage			Build_I-27			
Analyst:	TL/PK	Date:	1/31/2022		Area type:	l	Jrban
First year of analysi							
Last year of analysi							
Crash Data Descri							
Freeway segments	Segment crash data			No	,	of crash data	
	Project-level crash		?	No		of crash data	
Ramp segments	Segment crash data			No		of crash data	
	Project-level crash	data available	?	No	Last year c	of crash data	:
Ramp terminals	Segment crash data			No		of crash data	
	Project-level crash	data available	?	No	Last year o	of crash data	:
Estimated Crash S	tatistics						
Crashes for Entire	Facility		Total	K	Α	В	С
Estimated number of cra	shes during Study Period, o	crashes:	2405.1	11.1	42.0	236.1	740.1
Estimated average crash	freq. during Study Period,	crashes/yr:	126.6	0.6	2.2	12.4	39.0
Crashes by Facility	y Component	Nbr. Sites	Total	K	Α	В	С
Freeway segments,		3	835.9	2.8	7.7	54.0	188.3
Ramp segments, cr		16	935.2	7.8		125.3	334.6
Crossroad ramp ter	minals, crashes:	4	634.0	0.5		56.8	217.2
Crashes for Entire		Year	Total	K	Α	В	С
Estimated number of		2027	126.6	0.6		12.4	39.0
the Study Period, cr		2028	126.6	0.6		12.4	39.0
		2029	126.6	0.6	2.2	12.4	39.0
		2030	126.6	0.6		12.4	39.0
		2031	126.6	0.6		12.4	39.0
		2032	126.6	0.6		12.4	39.0
		2033	126.6	0.6		12.4	39.0
		2034	126.6	0.6		12.4	39.0
		2035	126.6	0.6		12.4	39.0
		2036	126.6	0.6		12.4	39.0
		2037	126.6	0.6		12.4	39.0
		2038	126.6	0.6		12.4	39.0
		2039	126.6	0.6		12.4	39.0
		2040	126.6	0.6		12.4	39.0
		2041	126.6	0.6		12.4	39.0
		2042	126.6	0.6		12.4	39.0
		2043	126.6	0.6		12.4	39.0
		2044	126.6	0.6		12.4	39.0
		2045	126.6	0.6		12.4	39.0
		2046					
		2047					
		2048					
		2049					
		2050					
Distribution of Cra	shes for Entire Facil						
Crash Type	Crash Type C	ategory				es During t	
	J.	atogory	Total	K	Α	В	C
Multiple vehicle	Head-on crashes:		17.6	0.1		2.5	7.9
	Right-angle crashes	S.	176.1	0.3		17.6	65.9
	Rear-end crashes:		1290.7	6.3		138.0	437.3
	Sideswipe crashes:		382.8	1.2	3.9	22.9	70.5
	Other multiple-vehic		120.1	1.0		16.4	46.5
	Total multiple-veh		1987.3	8.9		197.4	628.1
	10	al:	4.2	0.0		0.1	0.3
Single vehicle	Crashes with anima		044.0	1.6	5.0	27.6	79.8
Single vehicle	Crashes with fixed	object:	311.9	1.0			
Single vehicle			28.0	0.1		1.2	3.7
Single vehicle	Crashes with fixed	object:				1.2 0.5	3.7 1.5
Single vehicle	Crashes with fixed Crashes with other	object: ed vehicle:	28.0	0.1	0.2 0.1		
Single vehicle	Crashes with fixed Crashes with other Crashes with parke	object: ed vehicle: e crashes	28.0 6.3	0.1 0.0	0.2 0.1 1.7	0.5	1.5

	Evaluation Site Summary									
General Ir	formation		Lvaida	tion one o	aiiiiiai y					
Project des			70 from Gude Dr to MI	D 28 No Bi	ıild					
Analyst:		TL	Date:	1/31/2022		Area type:	Urban			
	of analysis:	2027	Total length of freewa		s for Study	Period (mi)	1.080			
	of analysis:	2045	Total longth of hooms	ry ooginions	o for Olday	i onod (iiii)	1.000			
Site Desci		20.0								
Freeway S										
Number	Lanes	Study Period	Study Period Descript	tion						
Number	Lancs	Length (mi)	Olday i Ciloa Descript	шоп						
1	9		GP MP 7.75 - MP 7.36							
2	8	0.020	GP MP 7.36 - MP 7.34							
3	8	0.590	GP MP 7.34- MP 6.75							
4	8	0.150	GP MP 6.75 - MP 6.60							
5	8	0.120	GP MP 6.60 - MP 6.48							
6	0	0.000	0							
7	0	0.000	0							
8	0	0.000	0							
9		0.000								
9 10	0 0	0.000	0							
10	0	0.000	0							
12	0	0.000	0							
			0							
13 14	0	0.000	0							
	0	0.000	0							
15 16	0	0.000	0							
16 17	0	0.000 0.000	0							
17	0 0		0							
19	0	0.000 0.000	0							
20	0	0.000	0							
Ramp Seg		0.000	U							
	Study Peri	od		Number	Study Per	iod				
Number	Description			Number	Descriptio					
1		.92 - MP 3.62		21	0	'''				
2	NB CD MP 3.			22	0					
3	NB CD MP 3.			23	0					
4	NB CD MP 2.			24	0					
5	NB CD MP 2.			25	0					
6		.68 - MP 1.84		26	0					
7	SB CD MP 1.			27	0					
8	SB CD MP 2.			28	0					
9	SB CD MP 2.			29	0					
10		.67 - MP 2.76		30	0					
11	0	20		31	0					
12	0			32	0					
13	0			33	0					
14	0			34	0					
15	0			35	0					
16	0			36	0					
17	0			37	0					
18	0			38	0					
19	0			39	0					
20	0			40	0					
	d Ramp Te	rminals	ı		ı					
Number	Config.	Control	Study Period Descript	tion						
1	0	0	0			1				
2	0	0	0							
3	0	0	0							
4	0	0	0							
5	Ő	0	0							
6	0	0	0							
•	•	_ •	I -			I				

		Qut	put Summa	ırv				
General Information	า	- Cut	put Guillina	ii y				
Project description:	ISATe I-270 from	Gude Dr to MC	28 No Buil	d				
Analyst:	TL		1/31/2022		Area type:	П	Jrban	
First year of analysis	. –	Date.	170172022		raca typo.		JI DUIT	
Last year of analysis								
Crash Data Descrip								
	Segment crash da	to available?		No	Eiret voor ei	f orach data	. 1	
Freeway segments			0		First year of crash data:			
<u> </u>	Project-level crash		!	No	Last year of			
Ramp segments	Segment crash dat			No	First year of			
	Project-level crash		?	No	Last year of			
Ramp terminals	Segment crash dat			No	First year of			
	Project-level crash	data available	?	No	Last year of	f crash data	:	
Estimated Crash St								
Crashes for Entire	Facility		Total	K	Α	В	С	PDO
Estimated number of cras	hes during Study Period,	crashes:	2343.2	12.0	35.4	210.3	667.2	1418.2
Estimated average crash	freq. during Study Period,	crashes/yr:	123.3	0.6	1.9	11.1	35.1	74.6
Crashes by Facility	Component	Nbr. Sites	Total	K	Α	В	С	PDO
Freeway segments,	•	5	1251.4	3.8		75.4	285.9	875.7
Ramp segments, cra		10	1091.9	8.2	24.9	134.9	381.4	542.5
Crossroad ramp tern		0	0.0	0.0	0.0	0.0	0.0	0.0
Crashes for Entire		Year	Total	K	Α	В	C 0.0	PDO
Estimated number of	<u> </u>							
	5	2027	123.3	0.6		11.1	35.1	74.6
the Study Period, cra	isnes:	2028	123.3	0.6	1.9	11.1	35.1	74.6
		2029	123.3	0.6		11.1	35.1	74.6
		2030	123.3	0.6		11.1	35.1	74.6
		2031	123.3	0.6	1.9	11.1	35.1	74.6
		2032	123.3	0.6		11.1	35.1	74.6
		2033	123.3	0.6		11.1	35.1	74.6
		2034	123.3	0.6	1.9	11.1	35.1	74.6
		2035	123.3	0.6	1.9	11.1	35.1	74.6
		2036	123.3	0.6	1.9	11.1	35.1	74.6
		2037	123.3	0.6	1.9	11.1	35.1	74.6
		2038	123.3	0.6	1.9	11.1	35.1	74.6
		2039	123.3	0.6		11.1	35.1	74.6
		2040	123.3	0.6		11.1	35.1	74.6
		2041	123.3	0.6		11.1	35.1	74.6
		2041	123.3	0.6		11.1	35.1	74.6
		2042	123.3	0.6			35.1	
						11.1		74.6
		2044	123.3	0.6		11.1	35.1	74.6
		2045	123.3	0.6	1.9	11.1	35.1	74.6
		2046						
		2047						
		2048						
		2049						
		2050						
Distribution of Cras	shes for Entire Faci	lity						
Crash Type	Crash Type (Category			er of Crash			
Olasii Type	Grasii Type C	Jalegory	Total	K	Α	В	С	PDO
Multiple vehicle	Head-on crashes:		15.1	0.1	0.4	2.3	6.8	5.5
-	Right-angle crashe	es:	28.1	0.2	0.5	2.9	9.7	14.9
			1286.1	7.3		127.5	400.1	729.4
	Rear-end crashes:					25.6	82.0	344.9
		s:	458.3	1.5	4.0			
	Sideswipe crashes			1.5			54.4	63.6
	Sideswipe crashes Other multiple-veh	icle crashes:	141.1	1.1	3.4	18.7	54.4 553.1	63.6 1158.4
Single vehicle	Sideswipe crashes Other multiple-veh Total multiple-ve	icle crashes: hicle crashes:	141.1 1928.8	1.1 10.2	3.4 30.2	18.7 177.0	553.1	1158.4
Single vehicle	Sideswipe crashes Other multiple-veh Total multiple-ve Crashes with anim	icle crashes: hicle crashes: al:	141.1 1928.8 4.8	1.1 10.2 0.0	3.4 30.2 0.0	18.7 177.0 0.1	553.1 0.4	1158.4 4.3
Single vehicle	Sideswipe crashes Other multiple-veh Total multiple-ve Crashes with anim Crashes with fixed	icle crashes: hicle crashes: al: object:	141.1 1928.8 4.8 304.7	1.1 10.2 0.0 1.3	3.4 30.2 0.0 3.7	18.7 177.0 0.1 23.9	553.1 0.4 81.8	1158.4 4.3 193.9
Single vehicle	Sideswipe crashes Other multiple-veh Total multiple-ve Crashes with anim Crashes with fixed Crashes with other	icle crashes: hicle crashes: al: object:	141.1 1928.8 4.8 304.7 35.5	1.1 10.2 0.0 1.3 0.1	3.4 30.2 0.0 3.7 0.2	18.7 177.0 0.1 23.9 1.3	553.1 0.4 81.8 4.8	1158.4 4.3 193.9 29.1
Single vehicle	Sideswipe crashes Other multiple-veh Total multiple-ve Crashes with anim Crashes with fixed Crashes with other Crashes with parker	icle crashes: hicle crashes: al: object: object: ed vehicle:	141.1 1928.8 4.8 304.7 35.5 6.0	1.1 10.2 0.0 1.3 0.1 0.0	3.4 30.2 0.0 3.7 0.2 0.1	18.7 177.0 0.1 23.9 1.3 0.5	553.1 0.4 81.8 4.8 1.6	1158.4 4.3 193.9 29.1 3.9
Single vehicle	Other multiple-veh Total multiple-ve Crashes with anim Crashes with fixed Crashes with other Crashes with parke Other single-vehicl	icle crashes: hicle crashes: al: object: object: ed vehicle: le crashes	141.1 1928.8 4.8 304.7 35.5 6.0 63.4	1.1 10.2 0.0 1.3 0.1 0.0 0.4	3.4 30.2 0.0 3.7 0.2 0.1 1.2	18.7 177.0 0.1 23.9 1.3 0.5 7.6	553.1 0.4 81.8 4.8 1.6 25.6	1158.4 4.3 193.9 29.1 3.9 28.7
Single vehicle	Sideswipe crashes Other multiple-veh Total multiple-ve Crashes with anim Crashes with fixed Crashes with other Crashes with parker	icle crashes: hicle crashes: al: object: object: ed vehicle: le crashes	141.1 1928.8 4.8 304.7 35.5 6.0	1.1 10.2 0.0 1.3 0.1 0.0	3.4 30.2 0.0 3.7 0.2 0.1 1.2	18.7 177.0 0.1 23.9 1.3 0.5	553.1 0.4 81.8 4.8 1.6	1158.4 4.3 193.9 29.1

Evaluation Site Summary										
General In	formation									
Project des	scription:	I-270 I-495	Managed	Lanes Stu	dy_2045 No	Build_I-27	0 from MD	28 to MD 1	189	
Analyst:	•	TL/PK		Date:	1/31/2022	_	Area type:		Urban	
	of analysis:	2027	Total lengt		ay segment			0.970		
	of analysis:	2045	Ī			,	` '			
Site Desci										
Freeway S										
Number	Lanes	Study Period	Study Perio	od Descrip	otion					
		Length (mi)	-	·						
1	9	0.290	GP MP 6.48 -	MP 6.19						
2	8	0.100	GP MP 6.19 -	MP 6.09						
3	8	0.230	GP MP 6.09 -	MP 5.85						
4	8	0.350	GP MP 5.85 -	MP 5.50						
5	0	0.000	0							
6	0	0.000	0							
7	0	0.000	0							
8	0	0.000	0							
9	0	0.000	0							
10	0	0.000	0							
11	0	0.000	0							
12	0	0.000	0							
13	0	0.000	0							
14	0	0.000	0							
15	0	0.000	0							
16	0	0.000	0							
17	0	0.000	0							
18	0	0.000	0							
19	0	0.000	0							
20	0	0.000	0							
Ramp Seg			1		1	r				
Number	Study Peri				Number	Study Peri				
	Description				21	Description	[]			-
1 2		.82 - MP 2.77 .77 - MP 2.64			22	0				
3		.64 - MP 2.46			23	0				
4		.46 - MP 2.28			24	0				
5		.28 - MP 2.02			25	0				
6		.02 - MP 1.87			26	0				
7		76 - MP 2.89			27	0				
8		.89 - MP 3.23			28	0				
9		23 - MP 3.59			29	0				
10		.59 - MP 3.76			30	0				
11		from I-270 NE			31	0				
12	-	from MD 28 V			32	0				
13	-	from MD 28 E			33	0				
14	-	p from I-270 N			34	0				
15		p from I-270 N			35	0				
16		p from I-270 S			36	0				
17		p from I-270 S			37	0				
18		from MD 28 E			38	0				
19	-	from MD 28 V			39	0				
20	0				40	0				
Crossroad	l Ramp Te	rminals								
Number	Config.	Control	Study Perio	od Descrip	otion					
1	D3ex	Signal	MD 28 at I-27	0 NB						
2	D3ex	Signal	MD 28 at I-27							
3	0	0	0							
4	0	0	0							
5	0	0	0							
6	0	0	0							
			•							

		Out	put Summa	arv				
General Information	า	Out	put Guilline	ai y				
Project description:	I-270 I-495 Managed	Lanes Stud	v 2045 No	Build I-27	0 from MD 2	28 to MD 189	9	
Analyst:	TL/PK		1/31/2022		Area type:		Jrban	
First year of analysis		Date.	170172022		r a ou typo.		, Dan	
Last year of analysis								
Crash Data Descrip								
Freeway segments	Segment crash data	available?	1	No	First year o	f crash data		
r reeway segments	Project-level crash da		.2	No	•	f crash data		
Ramp segments	Segment crash data		• •	No		f crash data		
Kamp segments	Project-level crash da		.2	No		f crash data		
Daman tannain ala	Segment crash data		i f	No		f crash data		
Ramp terminals	Project-level crash da		.2	No		f crash data		
Estimated Crash St		ila avallable	; f	NO	Lasi year o	i Crasii uala		
			Takal	1/	•		_	DDO
Crashes for Entire	•		Total	K	A	В	С	PDO
	hes during Study Period, cra		2856.1	14.9	51.4	291.6	854.9	1643.3
	freq. during Study Period, cra		150.3	0.8	2.7	15.3	45.0	86.5
Crashes by Facility	-	Nbr. Sites	Total	K	Α	В	С	PDO
Freeway segments,		4	1117.0	3.4	9.4	67.6	253.0	783.6
Ramp segments, cra		19	1327.2	11.2	33.9	183.9	494.2	604.0
Crossroad ramp tern		2	411.9	0.3	8.0	40.1	107.8	255.8
Crashes for Entire	Facility by Year	Year	Total	K	Α	В	С	PDO
Estimated number of	crashes during	2027	150.3	0.8	2.7	15.3	45.0	86.5
the Study Period, cra	•	2028	150.3	0.8	2.7	15.3	45.0	86.5
,		2029	150.3	0.8	2.7	15.3	45.0	86.5
		2030	150.3	0.8	2.7	15.3	45.0	86.5
		2031	150.3	0.8	2.7	15.3	45.0	86.5
		2032	150.3	0.8	2.7	15.3	45.0	86.5
		2033	150.3	0.8	2.7	15.3	45.0	86.5
		2034	150.3	0.8	2.7	15.3	45.0	86.5
		2035	150.3	0.8	2.7	15.3	45.0	86.5
		2036	150.3	0.8	2.7	15.3	45.0	86.5
		2037	150.3	0.8	2.7	15.3	45.0	86.5
		2037	150.3	0.8	2.7	15.3	45.0	86.5
		2039	150.3	0.8	2.7	15.3	45.0	86.5
		2040	150.3	0.8	2.7	15.3	45.0	86.5
		2041	150.3	0.8	2.7	15.3	45.0	86.5
		2042	150.3	0.8	2.7	15.3	45.0	86.5
		2043	150.3	0.8	2.7	15.3	45.0	86.5
		2044	150.3	0.8	2.7	15.3	45.0	86.5
		2045	150.3	8.0	2.7	15.3	45.0	86.5
		2046						
		2047						
		2048						
		2049						
		2050						
Distribution of Cras	shes for Entire Facility	/						
Crash Type	Crash Type Cat	edory				es During t		
	Grasii Type Gat	egoi y	Total	K	Α	В	С	PDO
Multiple vehicle	Head-on crashes:		20.8	0.2	0.6	3.2	9.2	7.5
	Right-angle crashes:		123.9	0.3		13.5	38.0	69.6
	Rear-end crashes:		1563.8	8.9	31.0	174.9	515.7	833.3
	Sideswipe crashes:		498.4	1.7	5.4	31.2	94.5	365.6
	Other multiple-vehicle	crashes:	167.9	1.4	4.4	24.1	67.7	70.3
	Total multiple-vehic		2374.9	12.5	43.9	246.9	725.1	1346.5
Single vehicle	Crashes with animal:		5.1	0.0	0.0	0.1	0.4	4.5
- Igio volliolo	Crashes with fixed ob	iect [.]	358.6	1.7	5.3	32.0	93.0	226.5
	Crashes with other of	•	33.8	0.1	0.2	1.4	4.5	27.7
	Crashes with parked		7.0	0.0	0.2	0.6	1.8	4.5
							30.1	33.7
	Other single-vehicle		76.7	0.6		10.6		
	Total single-vehicle		481.2	2.4		44.7	129.8	296.9
	Total crasl	nes:	2856.1	14.9	51.4	291.6	854.9	1643.3

Evaluation Site Summary								
Conoral In	General Information							
	Project description: ISATe_I-270 from MD 189 to Wootton Pkwy_No Build							
	scription.	TL		1/31/2022		Aros timo:	Urban	
Analyst:	of analysis:	2027	Total length of freewa			Area type:	0.600	
			Total length of freewa	y segment	s ioi Study	Period (IIII)	0.000	
	of analysis:	2045						
Site Desci								
Freeway S			10, 1 5 . 15			T		
Number	Lanes		Study Period Descript	ion				
	_	Length (mi)						
1	8	0.600	GP MP 5.50 - MP 4.90					
2	0	0.000	0					
3	0	0.000	0					
4	0	0.000	0					
5	0	0.000	0					
6	0	0.000	0					
7	0	0.000	0					
8	0	0.000	0					
9	0	0.000	0					
10	0	0.000	0					
11	0	0.000	0					
12	0	0.000	0					
13	0	0.000	0					
14	0	0.000	0					
15	0	0.000	0					
16	0	0.000	0					
17	0	0.000	0					
18	0	0.000	0					
19	0	0.000	0					
20	Ő	0.000	0					
Ramp Seg	•	0.000						
	Study Peri	od		Number	Study Per	iod		
ramboi	Description			rtarribor	Descriptio			
1	NB CD MP 1.			21	0			
2	NB CD MP 1.			22	0			
3	SB CD MP 3.			23	0			
4	SB CD MP 4.			24	0			
	C1-35 Ramp			25	0			
	C2-36 Ramp			26	0			
	C3-37 Ramp			27	0			
8	C3-38 Ramp			28	0			
9	C4-39 Ramp			29	0			
10	C4-39 Ramp			30	0			
11	C5-41 Ramp			31	0			
12	C6-42 Ramp			32	0			
13	C7-43 Ramp			33	0			
14	C7-43 Ramp			34	0			
	C8-45 Ramp			35	0			
16	C8-45 Ramp			36	0			
17	· ·	110111 1-210 55	1	37				
17	0			37 38	0			
	0				0			
19 20	0 0			39 40	0			
	∪ d Ramp Te	rminale		40	U			
Number			Study Poriod Descript	ion		1		
ivuitiber	Config.	Control	Study Period Descript	IUII				
- 1	0	0	0					
1	0	0	0					
2	0	0	0					
3	0	0	0					
4	0	0	0					
5	0	0	0					
6	0	0	0			1		

		Out	put Summa	arv				
General Information	1		par Gaiiiii	y				
Project description:	ISATe_I-270 from MI	D 189 to Wo	otton Pkwy	No Build				
Analyst:	TL		1/31/2022		Area type:	Ti.	Jrban	
First year of analysis	. –	Date.	1/31/2022		Alea type.		Jibali	
Last year of analysis:								
Crash Data Descrip				<u> </u>	(e. ,			
Freeway segments	Segment crash data			No		f crash data		
	Project-level crash d		?	No		f crash data		
Ramp segments	Segment crash data	available?		No	First year o	f crash data	:	
	Project-level crash d	ata available	?	No	Last year of	f crash data	:	
Ramp terminals	Segment crash data	available?		No	First year o	f crash data	:	
'	Project-level crash d		?	No	Last year o	f crash data	:	
Estimated Crash St	atistics				, ,			
Crashes for Entire I			Total	K	Α	В	С	PDO
	nes during Study Period, cra	schoo:	1757.2	13.3		223.2	652.2	828.8
	• •		92.5	0.7	2.1	11.7	34.3	43.6
•	req. during Study Period, cr							
Crashes by Facility	•	Nbr. Sites	Total	K	Α	В	C	PDO
Freeway segments, o		1	572.6	1.7		34.7	132.4	399.0
Ramp segments, cra		16	1184.5	11.5	34.9	188.5	519.8	429.8
Crossroad ramp term	ninals, crashes:	0	0.0	0.0	0.0	0.0	0.0	0.0
Crashes for Entire I	acility by Year	Year	Total	K	Α	В	С	PDO
Estimated number of	crashes during	2027	92.5	0.7	2.1	11.7	34.3	43.6
the Study Period, cra	3	2028	92.5	0.7	2.1	11.7	34.3	43.6
Staay i onou, ord		2029	92.5	0.7	2.1	11.7	34.3	43.6
		2030	92.5	0.7	2.1	11.7	34.3	43.6
		2031	92.5	0.7	2.1	11.7	34.3	43.6
		2032	92.5	0.7	2.1	11.7	34.3	43.6
		2033	92.5	0.7	2.1	11.7	34.3	43.6
		2034	92.5	0.7	2.1	11.7	34.3	43.6
		2035	92.5	0.7	2.1	11.7	34.3	43.6
		2036	92.5	0.7	2.1	11.7	34.3	43.6
		2037	92.5	0.7		11.7	34.3	43.6
		2038	92.5	0.7	2.1	11.7	34.3	43.6
		2039	92.5	0.7	2.1	11.7	34.3	43.6
		2040	92.5	0.7	2.1	11.7	34.3	43.6
		2041	92.5	0.7	2.1	11.7	34.3	43.6
		2042	92.5	0.7	2.1	11.7	34.3	43.6
		2043	92.5	0.7	2.1	11.7	34.3	43.6
		2044	92.5	0.7	2.1	11.7	34.3	43.6
		2045	92.5	0.7	2.1	11.7	34.3	43.6
		2046						
		2047						
		2048						
		2049						
		2049	+					
Diatribution of C	haa far Entira Fa-ilit							
טוטווטמוט סז Cras	hes for Entire Facilit	у .	F-4' · · ·	a al Nicori		aa Daad oo d	ha Ctart	Dawi
Crash Type	Crash Type Ca	tegory			er of Crash			
		J ,	Total	K	Α	В	С	PDO
Multiple vehicle	Head-on crashes:		15.5	0.2	0.5	2.8	8.1	3.9
viulupie venicie			40 oT	0.1	0.4	2.5	7.9	7.3
THE TOTAL PICTURE	Right-angle crashes:		18.3					
manapio vollidio			18.3	8.5		142.6	417.6	410.2
maniple veriles	Right-angle crashes:				25.5		417.6 80.3	
arupio vornole	Right-angle crashes: Rear-end crashes: Sideswipe crashes:		1004.4 316.6	8.5 1.6	25.5 4.8	142.6 27.1	80.3	410.2 202.8 44.0
manapio volitole	Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicl	e crashes:	1004.4 316.6 146.1	8.5 1.6 1.5	25.5 4.8 4.6	142.6 27.1 25.1	80.3 70.9	202.8 44.0
	Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicl Total multiple-vehic	e crashes:	1004.4 316.6 146.1 1500.9	8.5 1.6 1.5 11.9	25.5 4.8 4.6 35.8	142.6 27.1 25.1 200.2	80.3 70.9 584.8	202.8 44.0 668.2
Single vehicle	Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicl Total multiple-vehicl Crashes with animal:	e crashes:	1004.4 316.6 146.1 1500.9 2.7	8.5 1.6 1.5 11.9 0.0	25.5 4.8 4.6 35.8 0.0	142.6 27.1 25.1 200.2 0.1	80.3 70.9 584.8 0.2	202.8 44.0 668.2 2.4
	Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicl Total multiple-vehic Crashes with animal: Crashes with fixed of	e crashes: cle crashes: bject:	1004.4 316.6 146.1 1500.9 2.7 191.8	8.5 1.6 1.5 11.9 0.0 1.0	25.5 4.8 4.6 35.8 0.0 2.8	142.6 27.1 25.1 200.2 0.1 16.6	80.3 70.9 584.8 0.2 48.5	202.8 44.0 668.2 2.4 122.9
	Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicl Total multiple-vehicl Crashes with animal: Crashes with fixed of Crashes with other of	e crashes: cle crashes: bject:	1004.4 316.6 146.1 1500.9 2.7 191.8 17.7	8.5 1.6 1.5 11.9 0.0 1.0	25.5 4.8 4.6 35.8 0.0 2.8 0.1	142.6 27.1 25.1 200.2 0.1 16.6 0.7	80.3 70.9 584.8 0.2 48.5 2.3	202.8 44.0 668.2 2.4 122.9 14.6
	Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicl Total multiple-vehicl Crashes with animal: Crashes with fixed of Crashes with other of Crashes with parked	e crashes: cle crashes: bject: bject: vehicle:	1004.4 316.6 146.1 1500.9 2.7 191.8	8.5 1.6 1.5 11.9 0.0 1.0	25.5 4.8 4.6 35.8 0.0 2.8 0.1	142.6 27.1 25.1 200.2 0.1 16.6	80.3 70.9 584.8 0.2 48.5	202.8 44.0 668.2 2.4 122.9
	Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicl Total multiple-vehicl Crashes with animal: Crashes with fixed of Crashes with other of	e crashes: cle crashes: bject: bject: vehicle:	1004.4 316.6 146.1 1500.9 2.7 191.8 17.7	8.5 1.6 1.5 11.9 0.0 1.0	25.5 4.8 4.6 35.8 0.0 2.8 0.1 0.1	142.6 27.1 25.1 200.2 0.1 16.6 0.7	80.3 70.9 584.8 0.2 48.5 2.3	202.8 44.0 668.2 2.4 122.9 14.6
	Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicl Total multiple-vehicl Crashes with animal: Crashes with fixed of Crashes with other of Crashes with parked	e crashes: cle crashes: bject: bject: vehicle: crashes	1004.4 316.6 146.1 1500.9 2.7 191.8 17.7 3.6	8.5 1.6 1.5 11.9 0.0 1.0 0.0	25.5 4.8 4.6 35.8 0.0 2.8 0.1 0.1	142.6 27.1 25.1 200.2 0.1 16.6 0.7 0.3	80.3 70.9 584.8 0.2 48.5 2.3 0.9	202.8 44.0 668.2 2.4 122.9 14.6 2.3

	Evaluation Site Summary							
General In	formation		Evalua	tion one o	anniary			
Project des			70 from Wootton Pkwy	to Montro	se Rd No E	Build		
Analyst:	1 ***	TL	Date:	1/31/2022		Area type:	Urban	
First year o	of analysis:	2027	Total length of freewa			Period (mi)	0.760	
	of analysis:	2045	İ	, ,	•	` ,		
Site Desci		<u>'</u>						
Freeway S								
Number	Lanes	Study Period	Study Period Descrip	tion				
		Length (mi)						
1	8	0.360	GP MP 4.90 - MP 4.54					
2	9	0.010	GP MP 4.54 - MP 4.53					
3	10	0.390	GP MP 4.53 - MP 4.14					
4	0	0.000	0					
5	0	0.000	0					
6	0	0.000	0					
7	0	0.000	0					
8	0	0.000	0					
9	0	0.000	0					
10	0	0.000	0					
11	0	0.000	0					
12	0	0.000	0					
13	0	0.000	0					
14	0	0.000	0					
15	0	0.000	0					
16	0	0.000	0					
17	0	0.000	0					
18 19	0	0.000	0					
20	0 0	0.000 0.000	0					
Ramp Seg	-	0.000	O					
	Study Peri	od		Number	Study Peri	iod		
	Description				Description			
	NB CD MP 1	.25 - MP 0.95		21	0			
		.95 - MP 0.70		22	0			
		.70 - MP 0.52		23	0			
		.52 - MP 0.48		24	0			
	SB CD MP 4.			25	0			
	SB CD MP 4.			26	0			
	SB CD MP 4.			27	0			
_	SB CD MP 5.	.∪3 - MP 5.09		28	0			
	0			29 30	0			
	0 0			30	0			
	0			32	0			
	0			33	0			
	0			34	0			
	0			35	0			
	0			36	0			
	0			37	0			
	0			38	0			
19	0			39	0			
20	0			40	0			
	d Ramp Te							
Number	Config.	Control	Study Period Descrip	tion				
1	0	0	0					
2	0	0	0					
3	0	0	0					
4	0	0	0					
5	0	0	0					
6	0	0	0					

		Out	put Summ	ary				
General Information	1			<i>,</i>				
Project description:	ISATe I-270 from	Wootton Pkwy	to Montros	e Rd No E	Build			
Analyst:	TL		1/31/2022		Area type:	li li	Urban	
First year of analysis		154.0.	., 0 1, 2022		, " oa typo.		J. 5411	
Last year of analysis:								
Crash Data Descrip								
	Segment crash da	ta available?	I	No	Firet year o	of crash data	· I	
Freeway segments								
<u> </u>	Project-level crash) (No		f crash data		
Ramp segments	Segment crash da		_	No	, ,	f crash data		
	Project-level crash		?	No		f crash data		
Ramp terminals	Segment crash da		_	No		of crash data		
	Project-level crash	ı data available	?	No	Last year o	f crash data	a:	
Estimated Crash St	atistics							
Crashes for Entire I	Facility		Total	K	Α	В	С	PDO
Estimated number of crash	nes during Study Period,	crashes:	1978.5	12.8	36.3	212.8	652.3	1064.4
Estimated average crash f			104.1	0.7	1.9	11.2	34.3	56.0
Crashes by Facility		Nbr. Sites	Total	K	Α	В	С	PDO
Freeway segments, of		3	957.9	3.5		60.4	220.3	665.6
Ramp segments, cra		8	1020.6	9.3		152.4	432.0	398.8
Crossroad ramp term		0	0.0	0.0	0.0	0.0	0.0	396.c
		× .						
Crashes for Entire I		Year	Total	K	Α	B 44.0	С	PDO
Estimated number of	0	2027	104.1	0.7	1.9	11.2	34.3	56.0
the Study Period, cra	ishes:	2028	104.1	0.7	1.9	11.2	34.3	56.0
		2029	104.1	0.7	1.9	11.2	34.3	56.0
		2030	104.1	0.7	1.9	11.2	34.3	56.0
		2031	104.1	0.7	1.9	11.2	34.3	56.0
		2032	104.1	0.7	1.9	11.2	34.3	56.0
		2033	104.1	0.7	1.9	11.2	34.3	56.0
		2034	104.1	0.7	1.9	11.2	34.3	56.0
		2035	104.1	0.7	1.9	11.2	34.3	56.0
		2036	104.1	0.7	1.9	11.2	34.3	56.0
		2037	104.1	0.7	1.9	11.2	34.3	56.0
		2038	104.1	0.7	1.9	11.2	34.3	56.0
		2039	104.1	0.7	1.9	11.2	34.3	56.0
		2040	104.1	0.7	1.9	11.2	34.3	56.0
		2041	104.1	0.7	1.9	11.2	34.3	56.0
		2042	104.1	0.7	1.9	11.2	34.3	56.0
		2043	104.1	0.7	1.9	11.2	34.3	56.0
		2044	104.1	0.7	1.9	11.2	34.3	56.0
		2045	104.1	0.7	1.9	11.2	34.3	56.0
		2046						
		2047						
		2048						
		2049						
		2050						
Distribution of Cras	hes for Entire Fac				1			
		•	Estima	ted Numb	er of Crash	es During	the Study	Period
Crash Type	Crash Type	Category	Total	K	A	B	C	PDO
Multiple vehicle	Head-on crashes:		14.6	0.2	0.4	2.5	7.4	4.2
manipie veniole	Right-angle crash	DC:	23.3	0.2	0.4	2.8	8.9	4.2 11.1
	Rear-end crashes		1119.3	8.0		133.6	405.4	549.2
	Sideswipe crashes		367.7	1.6		26.2	80.7	254.7
	Other multiple-veh		135.7	1.3	3.9	21.3	61.5	47.8
	Total multiple-ve		1660.7	11.2	32.3	186.4	563.9	866.9
Single vehicle	Crashes with anim	nal:	4.0	0.0	0.0	0.1	0.3	3.5
	Crashes with fixed	l object:	233.9	1.1	2.9	19.0	63.7	147.2
	Crashes with othe		26.7	0.1	0.1	1.0	3.6	21.8
			4.7	0.0		0.4	1.3	3.0
	Crashes with parked vehicle:		48.6	0.3		5.9	19.5	22.1
	Other single-vehicle crashes Total single-vehicle crashes:		317.8	1.6		26.4	88.4	197.5
		rashes:	1978.5	12.8		212.8	652.3	1064.4
						/ / / 0		

	Evaluation Site Summary							
General In	formation		Lvaida	ion one o	annia y			
Project des			70 from Montrose Rd t	o I-270 Y I	No Build			
Analyst:	•	TL		1/31/2022		Area type:	Urban	
First year	of analysis:	2027	Total length of freewa			Period (mi)	1.470	
	of analysis:	2045	, and the second	, ,	•	` ,		
Site Desci		<u>'</u>						
Freeway S								
Number	Lanes	Study Period	Study Period Descript	tion				
		Length (mi)						
1	10	0.460	GP MP 4.14 - MP 3.64					
2	10	0.010	GP MP 3.64 - MP 3.60					
3	10	0.890	GP MP 3.60 - MP 2.77					
4	10	0.110	GP MP 2.77 - MP 2.67					
5	0	0.000	0					
6	0	0.000	0					
7	0	0.000	0					
8	0	0.000	0					
9	0	0.000	0					
10	0	0.000	0					
11	0	0.000	0					
12	0	0.000	0					
13 14	0 0	0.000 0.000	0					
15	0	0.000	0					
16	0	0.000	0					
17	0	0.000	0					
18	0	0.000	0					
19	0	0.000	0					
20	0	0.000	0					
Ramp Seg								
Number	Study Peri			Number	Study Peri			
	Description			04	Description			
1 2		.48 - MP 0.42		21 22		p from I-270 N		
3	NB CD MP 0	.42 - MP 0.27 .27 <i>-</i> MP 0.00		23	0 Ram	p from Montro		
4	SB CD MP 5.			24	0			
5	SB CD MP 5.			25	0			
6	SB CD MP 5.			26	0			
7		from I-270 NE		27	0			
8	-	from Montros		28	0			
9	-	from Montros		29	0			
10	C3-50 Ramp	from Montros		30	0			
11	-	from I-270 NE		31	0			
12		from I-270 SB		32	0			
13	-	from Montros		33	0			
14		from Montros		34	0			
15	-	from Montros		35	0			
16		from Montros		36	0			
17	-	from I-270 SB		37	0			
18 19	-	from I-270 SB		38 39	0			
20	-	from Tower O o from I-270 N		40	0			
	d Ramp Te		1	,,,	1~			
Number	Config.	Control	Study Period Descript	tion				
1	B2	Signal	I-270 NB at Tower Oaks Bo	oulevard				
2	0	0	0					
3	0	0	0					
4	0	0	0					
5	0	0	0					
6	0	0	0					

		Out	put Summa	arv				
General Information			put Guilline	*·· y				
Project description:	ISATe I-270 from Mo	ontrose Rd to	1-270 Y N	o Build				
Analyst:	TL		1/31/2022		Area type:	Ti.	Jrban	
First year of analysis:	. –	Date.	170172022		Alca type.		nban	
Last year of analysis:								
, , ,								
Crash Data Descript				NI-	F:4	£ll-4-		
Freeway segments	Segment crash data		_	No	•	f crash data		
	Project-level crash da		?	No		f crash data		
Ramp segments	Segment crash data	available?		No	First year o	f crash data	:	
	Project-level crash da	ata available	?	No	Last year of	f crash data	:	
Ramp terminals	Segment crash data	available?		No	First year o	f crash data	:	
'	Project-level crash da	ata available	?	No	Last year o	f crash data	:	
Estimated Crash Sta	atistics							
Crashes for Entire F			Total	К	Α	В	С	PDO
	es during Study Period, cra	ahaa	2628.7	13.2	37.6	227.7	654.8	1695.4
			138.4	0.7	2.0	12.0	34.5	89.2
·	eq. during Study Period, cr				_	_		
Crashes by Facility	•	Nbr. Sites	Total	K	Α	В	C	PDO
Freeway segments, o		4	1917.3	8.1	17.1	126.9	434.3	1330.9
Ramp segments, cras		22	534.5	4.8	14.6	76.5	175.5	263.1
Crossroad ramp term	inals, crashes:	1	176.9	0.2	5.9	24.2	45.1	101.4
Crashes for Entire F	acility by Year	Year	Total	K	Α	В	С	PDO
Estimated number of	, , ,	2027	138.4	0.7	2.0	12.0	34.5	89.2
the Study Period, cra	3	2028	138.4	0.7	2.0	12.0	34.5	89.2
the Study Feriou, Ga	31163.	2029	138.4	0.7	2.0	12.0	34.5	89.2
		2030	138.4	0.7	2.0	12.0	34.5	89.2
		2031	138.4	0.7	2.0	12.0	34.5	89.2
		2032	138.4	0.7	2.0	12.0	34.5	89.2
		2033	138.4	0.7	2.0	12.0	34.5	89.2
		2034	138.4	0.7	2.0	12.0	34.5	89.2
		2035	138.4	0.7	2.0	12.0	34.5	89.2
		2036	138.4	0.7	2.0	12.0	34.5	89.2
		2037	138.4	0.7	2.0	12.0	34.5	89.2
		2038	138.4	0.7	2.0	12.0	34.5	89.2
		2039	138.4	0.7	2.0	12.0	34.5	89.2
		2040	138.4	0.7	2.0	12.0	34.5	89.2
		2041	138.4	0.7	2.0	12.0	34.5	89.2
		2042	138.4	0.7	2.0	12.0	34.5	89.2
		2043	138.4	0.7	2.0	12.0	34.5	89.2
		2044	138.4	0.7	2.0	12.0	34.5	89.2
		2045	138.4	0.7	2.0	12.0	34.5	89.2
		2046		J.,				JU.E
		2047						
		2047						
		2048				+		
						-		
B		2050						
Distribution of Cras	hes for Entire Facilit	у						
Crash Type	Crash Type Ca	tegory	Estimat		er of Crash			
Crasii rype	Crasii Type Ca	legol y	Total	K	Α	В	С	PDO
Multiple vehicle	Head-on crashes:		11.8	0.1	0.3	1.8	5.0	4.5
'	Right-angle crashes:		75.3	0.3		9.5	22.2	41.4
	Rear-end crashes:		1374.3	6.9	20.3	122.2	356.1	868.8
	Sideswipe crashes:		448.0	1.5		24.6	75.5	342.6
		o oroslar -						
	Other multiple-vehicle		88.7	0.7	1.9	10.9	29.5	45.6
	Total multiple-vehic		1998.3	9.4	28.3	169.1	488.4	1303.0
Single vehicle	Crashes with animal:		8.3	0.0	0.0	0.2	0.6	7.4
	Crashes with fixed of	oject:	463.4	2.7	6.7	42.1	120.0	291.9
	Crashes with other o	•	55.0	0.1	0.3	2.3	7.4	44.8
	Crashes with parked		8.8	0.1	0.1	0.8	2.3	5.6
			94.9	0.8	.	13.1	36.2	42.7
	Other single-vehicle crashes Total single-vehicle crashes:		630.4					
				3.7	9.3	58.6	166.4	392.4
	Total cras	nes:	2628.7	13.2	37.6	227.7	654.8	1695.4

	Evaluation Site Summary							
General In	formation		Evaluat	ion one o	anima y			
Project des			70 from I-270 Y to Roc	kledae Blv	d No Build			
Analyst:		TL		1/31/2022		Area type:	Urban	
First year o	of analysis:	2027	Total length of freewa			Period (mi)	0.810	
	of analysis:	2045	İ	, 3	,	()		
Site Desci								
Freeway S								
Number	Lanes	Study Period	Study Period Descript	tion				
		Length (mi)						
1	6	0.050	GP MP 2.67 - MP 2.62					
2	6	0.050	GP MP 2.62 - MP 2.57					
3	6	0.130	GP MP 2.57 - MP 2.45					
4	7	0.220	GP MP 2.45 - MP 2.23					
5	8	0.090	GP MP 2.23 - MP 2.13					
6	7	0.050	GP MP 2.13 - MP 2.08					
7	6	0.220	GP MP 2.08 - MP 1.87					
8	0	0.000	0					
9	0	0.000	0					
10	0	0.000	0					
11	0	0.000	0					
12	0	0.000	0					
13	0	0.000	0					
14	0	0.000	0					
15	0	0.000	0					
16	0	0.000	0					
17	0	0.000	0					
18	0	0.000	0					
19	0	0.000	0					
20	0	0.000	0					
Ramp Seg			T	1	T			
	Study Peri			Number	Study Peri			
	Description G-62 Ramp fi			21	Descriptio 0	11		
	H-63 Ramp fr			22	0			
	0 Rainp ii	OIII I-270 IND		23	0			
	0			24	0			
	0			25	0			
	0			26	0			
	0			27	0			
	0			28	0			
	0			29	0			
10	0			30	0			
	0			31	0			
	0			32	0			
	0			33	0			
	0			34	0			
	0			35	0			
	0			36	0			
	0			37	0			
	0			38	0			
19	0			39	0			
20	0			40	0			
	d Ramp Te							
Number	Config.	Control	Study Period Descript	tion				
1	0	0	0					
2	0	0	0					
3	0	0	0					
4	0	0	0					
5	0	0	0					
6	0	0	О					

		Out	put Summa	ary				
General Information	1			,				
Project description:	ISATe I-270 from I-2	70 Y to Roc	kledge Blvd	No Build				
Analyst:	TL TL		1/31/2022	_	Area type: Urban			
First year of analysis	. –	1				1		
Last year of analysis								
Crash Data Descrip								
Freeway segments	Segment crash data	available?		No	First vear	of crash data	a·	
i reeway segments	Project-level crash da		2	No		of crash data		
Damen as succeeds	-		r -		•			
Ramp segments	Segment crash data		0	No	,	of crash data		
	Project-level crash da		?	No		of crash data		
Ramp terminals	Segment crash data		_	No		of crash data		
	Project-level crash da	ata available	?	No	Last year c	of crash data	a:	
Estimated Crash St								
Crashes for Entire I	Facility		Total	K	Α	В	С	PDO
Estimated number of crash	nes during Study Period, cra	shes:	620.6	2.8	7.9	48.6	140.5	420.9
Estimated average crash f	req. during Study Period, cra	ashes/yr:	32.7	0.1	0.4	2.6	7.4	22.2
Crashes by Facility	Component	Nbr. Sites	Total	K	Α	В	С	PDO
Freeway segments, o	-	7	548.1	1.9	5.2	37.0	120.5	383.6
Ramp segments, cra		2	72.6	0.9		11.7	20.0	37.3
Crossroad ramp term		0	0.0	0.0		0.0	0.0	0.0
Crashes for Entire I		Year	Total	K	Α	В	C	PDO
Estimated number of	0	2027	32.7	0.1	0.4	2.6	7.4	22.2
the Study Period, cra	isnes:	2028	32.7	0.1	0.4	2.6	7.4	22.2
		2029	32.7	0.1	0.4	2.6	7.4	22.2
		2030	32.7	0.1	0.4	2.6	7.4	22.2
		2031	32.7	0.1	0.4	2.6	7.4	22.2
		2032	32.7	0.1	0.4	2.6	7.4	22.2
		2033	32.7	0.1	0.4	2.6	7.4	22.2
		2034	32.7	0.1	0.4	2.6	7.4	22.2
		2035	32.7	0.1	0.4	2.6	7.4	22.2
		2036	32.7	0.1	0.4	2.6	7.4	22.2
		2037	32.7	0.1	0.4	2.6	7.4	22.2
		2038	32.7	0.1	0.4	2.6	7.4	22.2
		2039	32.7	0.1	0.4	2.6	7.4	22.2
		2040	32.7	0.1	0.4	2.6	7.4	22.2
		2041	32.7	0.1	0.4	2.6	7.4	22.2
		2041	32.7	0.1				22.2
		2042			0.4	2.6 2.6	7.4 7.4	
			32.7	0.1	0.4			22.2
		2044	32.7	0.1	0.4	2.6	7.4	22.2
		2045	32.7	0.1	0.4	2.6	7.4	22.2
		2046						
		2047						
		2048						
		2049						
		2050						
Distribution of Cras	hes for Entire Facilit	у						
Crock Tune	Crock Tune Co	togony	Estimat		er of Crash	es During		
Crash Type	Crash Type Ca	legory	Total	K	Α	В	С	PDO
Multiple vehicle	Head-on crashes:		1.5	0.0	0.0	0.2	0.6	0.6
·	Right-angle crashes:		8.2	0.0		0.7	2.4	5.0
	Rear-end crashes:		281.5	1.0	2.8	19.6	63.3	194.8
	Sideswipe crashes:		94.6	0.2	0.7	4.8	15.6	73.2
	Other multiple-vehicle	e crashes	10.3	0.0	0.1	0.8	2.5	6.8
	Total multiple-vehice			1.4	3.7	26.2	84.4	280.4
Cinalo vobiele			396.1			1		
Single vehicle	Crashes with animal:		2.8	0.0	0.0	0.1	0.2	2.5
Crashes with fixed obj			165.6	1.0		16.1	40.3	105.1
	Crashes with other object:		19.1	0.0	0.1	0.8	2.3	15.8
					· · · · · · · · · · · · · · · · · · ·			
	Crashes with parked	vehicle:	2.9	0.0	0.1	0.3	0.7	1.9
	Crashes with parked Other single-vehicle	vehicle: crashes	2.9 34.2	0.0 0.3	1.0	5.2	12.5	15.1
	Crashes with parked	vehicle: crashes crashes:	2.9	0.0	1.0 4.1			

	Evaluation Site Summary						
General In	formation		Lvaida	tion one o	anniary		
Project des			Managed Lanes Stud	dy 2045 No	Build I-27	0 from MD 1	187 to Rockledge Boulevard
Analyst:		TL/PK	Date:	1/31/2022		Area type:	Urban
	of analysis:	2027	Total length of freewa			Period (mi)	0.290
	of analysis:	2045	İ	, ,	•	, ,	
Site Desci		<u>'</u>					
Freeway S							
Number	Lanes	Study Period	Study Period Descrip	tion			
		Length (mi)	,				
1	6	0.180	GP MP 1.87 - MP 1.69				
2	6	0.010	GP MP 1.69 - MP 1.68				
3	6	0.100	GP MP 1.68 - MP 1.58				
4	0	0.000	0				
5	0	0.000	0				
6	0	0.000	0				
7	0	0.000	0				
8	0	0.000	0				
9	0	0.000	0				
10	0	0.000	0				
11	0	0.000	0				
12	0	0.000	0				
13	0	0.000	0				
14	0	0.000	0				
15	0	0.000	0				
16	0	0.000	0				
17	0	0.000	0				
18	0	0.000	0				
19	0	0.000	0				
20	0	0.000	0				
Ramp Seg		1	Т	I Monada a a	[O4 D	1	
Number	Study Peri Description			Number	Study Peri Description		
1		from I-270 NE		21	0		
	G4-67 Ramp			22	0		
	G3-64 Ramp			23	0		
4	-	from Rockled		24	0		
5	0			25	0		
6	0			26	0		
7	0			27	0		
8	0			28	0		
9	0			29	0		
10	0			30	0		
	0			31	0		
12	0			32	0		
13	0			33	0		
14	0			34	0		
15	0			35	0		
	0			36	0		
17	0			37	0		
18	0			38	0		
19 20	0 0			39 40	0		
	∪ d Ramp Te	rminals	l	40	0		
Number	Config.	Control	Study Period Descrip	tion			
1	D4	Signal	Rockledge Boulevard at I-2	270 WR		1	
2	D4	Signal	Rockledge Boulevard at I-2				
3	0	0	0	0 _0			
4	0	0	0				
5	0	0	0				
6	0	Ö	0				

		Out	put Summa	arv				
General Information	1			· •				
Project description:	I-270 I-495 Managed	Lanes Stud	v 2045 No	Build I-27	0 from MD	187 to Rock	dedae Boul	evard
Analyst:	TL/PK		1/31/2022		Area type:		Urban	
First year of analysis		2 4.10.	., 0 ., _ 0		, o a. 1, p o .		0.24	
Last year of analysis								
Crash Data Descrip								
Freeway segments	Segment crash data	available?	1	No	First vear	of crash data	a· I	
i reeway segments	Project-level crash da		2	No		of crash data		
Down coamonto	Segment crash data		1			of crash data		
Ramp segments			2	No No		of crash data		
Damen tamainala	Project-level crash data		f	No				
Ramp terminals	Segment crash data		2	No		of crash date		
Fatimated Creek Ct	Project-level crash da	ata avallable	ſ	INO	Last year c	of crash data	1.	
Estimated Crash St		1		1.4				
Crashes for Entire			Total	K	Α	В	С	PDO
	hes during Study Period, cra		610.4	1.4		40.7	152.9	408.4
·	freq. during Study Period, cra	ashes/yr:	32.1	0.1	0.4	2.1	8.0	21.5
Crashes by Facility	Component	Nbr. Sites	Total	K	Α	В	С	PDO
Freeway segments,		3	163.6	0.6	1.6	11.2	35.0	115.2
Ramp segments, cra		4	70.5	0.6	1.9	8.1	19.9	39.8
Crossroad ramp term		2	376.3	0.1	3.6	21.3	98.0	253.4
Crashes for Entire	Facility by Year	Year	Total	K	Α	В	С	PDO
Estimated number of		2027	32.1	0.1	0.4	2.1	8.0	21.5
the Study Period, cra		2028	32.1	0.1	0.4	2.1	8.0	21.5
		2029	32.1	0.1	0.4	2.1	8.0	21.5
		2030	32.1	0.1	0.4	2.1	8.0	21.5
		2031	32.1	0.1	0.4	2.1	8.0	21.5
		2032	32.1	0.1	0.4	2.1	8.0	21.5
		2032	32.1	0.1	0.4	2.1	8.0	21.5
		2034	32.1	0.1	0.4	2.1	8.0	21.5
		2035	32.1		0.4	2.1		21.5
			_	0.1			8.0	
		2036	32.1	0.1	0.4	2.1	8.0	21.5
		2037	32.1	0.1	0.4	2.1	8.0	21.5
		2038	32.1	0.1	0.4	2.1	8.0	21.5
		2039	32.1	0.1	0.4	2.1	8.0	21.5
		2040	32.1	0.1	0.4	2.1	8.0	21.5
		2041	32.1	0.1	0.4	2.1	8.0	21.5
		2042	32.1	0.1	0.4	2.1	8.0	21.5
		2043	32.1	0.1	0.4	2.1	8.0	21.5
		2044	32.1	0.1	0.4	2.1	8.0	21.5
		2045	32.1	0.1	0.4	2.1	8.0	21.5
		2046						
		2047						
		2048						
		2049						
		2050						
Distribution of Cras	shes for Entire Facility							
			Estimat	ted Numbe	er of Crash	es During	the Study	Period
Crash Type	Crash Type Cat	egory	Total	K	A	B	C	PDO
Multiple vehicle	Head-on crashes:		3.7	0.0	0.1	0.3	1.3	2.0
Multiple vehicle			0.7	0.0				57.3
'			90.2	0 0	1 ∩	5 Q	/n / i	
	Right-angle crashes:		90.2	0.0	1.0	5.8	26.2	
·	Right-angle crashes: Rear-end crashes:		307.4	0.5	3.3	20.3	82.2	201.2
'	Right-angle crashes: Rear-end crashes: Sideswipe crashes:	oraches	307.4 75.6	0.5 0.1	3.3 0.4	20.3 2.5	82.2 9.1	201.2 63.4
·	Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle		307.4 75.6 11.1	0.5 0.1 0.0	3.3 0.4 0.1	20.3 2.5 0.6	82.2 9.1 2.1	201.2 63.4 8.2
	Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehic		307.4 75.6 11.1 488.0	0.5 0.1 0.0 0.7	3.3 0.4 0.1 4.8	20.3 2.5 0.6 29.5	82.2 9.1 2.1 120.9	201.2 63.4 8.2 332.1
Single vehicle	Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehic Crashes with animal:	le crashes:	307.4 75.6 11.1 488.0 1.0	0.5 0.1 0.0 0.7 0.0	3.3 0.4 0.1 4.8 0.0	20.3 2.5 0.6 29.5 0.0	82.2 9.1 2.1 120.9 0.1	201.2 63.4 8.2 332.1
	Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehic Crashes with animal: Crashes with fixed ob	le crashes: oject:	307.4 75.6 11.1 488.0 1.0 92.1	0.5 0.1 0.0 0.7 0.0 0.5	3.3 0.4 0.1 4.8 0.0 1.6	20.3 2.5 0.6 29.5 0.0 7.9	82.2 9.1 2.1 120.9 0.1 22.4	201.2 63.4 8.2 332.1 0.9 59.6
	Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehic Crashes with animal: Crashes with fixed ob	le crashes: oject: oject:	307.4 75.6 11.1 488.0 1.0 92.1 7.3	0.5 0.1 0.0 0.7 0.0 0.5 0.0	3.3 0.4 0.1 4.8 0.0 1.6 0.1	20.3 2.5 0.6 29.5 0.0 7.9 0.3	82.2 9.1 2.1 120.9 0.1 22.4 0.9	201.2 63.4 8.2 332.1 0.9 59.6
	Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehic Crashes with animal: Crashes with fixed ob Crashes with other of Crashes with parked	le crashes: oject: oject: vehicle:	307.4 75.6 11.1 488.0 1.0 92.1 7.3 1.9	0.5 0.1 0.0 0.7 0.0 0.5 0.0	3.3 0.4 0.1 4.8 0.0 1.6 0.1	20.3 2.5 0.6 29.5 0.0 7.9 0.3 0.1	82.2 9.1 2.1 120.9 0.1 22.4 0.9 0.4	201.2 63.4 8.2 332.1 0.9 59.6 6.0
	Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehic Crashes with animal: Crashes with fixed ob Crashes with other of Crashes with parked Other single-vehicle of	oject: vehicle: crashes	307.4 75.6 11.1 488.0 1.0 92.1 7.3 1.9 20.1	0.5 0.1 0.0 0.7 0.0 0.5 0.0 0.0 0.0	3.3 0.4 0.1 4.8 0.0 1.6 0.1 0.0 0.6	20.3 2.5 0.6 29.5 0.0 7.9 0.3 0.1 2.8	82.2 9.1 2.1 120.9 0.1 22.4 0.9 0.4 8.0	201.2 63.4 8.2 332.1 0.9 59.6
	Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehic Crashes with animal: Crashes with fixed ob Crashes with other of Crashes with parked	oject: vehicle: crashes	307.4 75.6 11.1 488.0 1.0 92.1 7.3 1.9	0.5 0.1 0.0 0.7 0.0 0.5 0.0	3.3 0.4 0.1 4.8 0.0 1.6 0.1	20.3 2.5 0.6 29.5 0.0 7.9 0.3 0.1	82.2 9.1 2.1 120.9 0.1 22.4 0.9 0.4	201.2 63.4 8.2 332.1 0.9 59.6 6.0

Evaluation Site Summary								
Conoral In	formation		Evalua	lion site s	ullillary			
Project des			Managed Lanes Stud	N 2015 No	Build I 07	10 from 1 101	5 to MD 197	
	scription.							
Analyst:		TL/PK	Date:	1/31/2022		Area type:	Urban	
First year o		2027	Total length of freewa	y segment	s for Study	Period (mi)	1.410	
	of analysis:	2045						
Site Desci								
Freeway S	Segments							
Number	Lanes	Study Period	Study Period Descript	tion				
		Length (mi)						
1	6	0.150	GP MP 1.58 - MP 1.43					
2	6	0.030	GP MP 1.43 - MP 1.40					
3	6	1.090	GP MP 1.40 - MP 0.31					
4	5	0.050	GP MP 0.22 - MP 0.17					
5	6	0.090	GP MP 0.31 - MP 0.22					
6	0	0.000						
			0					
7	0	0.000	0					
8	0	0.000	0					
9	0	0.000	0					
10	0	0.000	0					
11	0	0.000	0					
12	0	0.000	0					
13	0	0.000	0					
14	0	0.000	0					
15	0	0.000	0					
16	0	0.000	0					
17	0	0.000	0					
18	0	0.000	0					
19	0	0.000	0					
20	0	0.000	0					
Ramp Seg	,	0.000	0					
	Study Peri	od		Number	Study Peri	iod		
	Description			Number	Descriptio			
	G2-68 Ramp			21	0	11		
	G2-69 Ramp			22	0			
_	-	IIOIII I-270 INE		23	0			
	0			23				
	0				0			
	G4-72 Ramp			25	0			
	G6-73 Ramp			26	0			
7	G6-74 Ramp	trom I-270 SE		27	0			
_	0			28	0			
9	G8-76 Ramp	from MD 187		29	0			
10	G8-77 Ramp			30	0			
	G4-72.1 Ram	p from MD 18		31	0			
12	0			32	0			
	0			33	0			
	0			34	0			
15	0			35	0			
	0			36	0			
	0			37	0			
	0			38	0			
19	0			39	0			
20	0			40	0			
	d Ramp Te	rminals	l	1 10	1~			
Number	Config.	Control	Study Period Descrip	tion				
1	D4	Signal	MD 187 at I-270 WB					
2	D4 D4	Signal	MD 187 at I-270 WB					
	0	olghai 0						
3	_	_	0					
4	0	0	0					
5	0	0	0					
6	0	0	0					

		Out	put Summa	arv				
General Information			put Guilline	<u>y</u>				
Project description:	I-270 I-495 Manage	d Lanes Stud	v 2045 No	Build I-27	0 from I-495	to MD 187		
Analyst:	TL/PK		1/31/2022		Area type:		Jrban	
First year of analysis:		12 4.10.	., ., .,		, o typo.		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
Last year of analysis:								
Crash Data Descrip								
Freeway segments	Segment crash data	a available?	1	No	First year o	f crash data		
i reeway segments	Project-level crash		2	No	•	f crash data		
Down coamonto	Segment crash data		!	No		f crash data		
Ramp segments	Project-level crash o		2					
D	<u> </u>			No		f crash data		
Ramp terminals	Segment crash data		2	No		f crash data		
F-4:	Project-level crash	data avallable	?	No	Last year o	f crash data	:	
Estimated Crash St				1.2				
Crashes for Entire I			Total	K	Α	В	С	PDO
Estimated number of crash	• •		1529.1	4.0	16.7	109.5	452.2	946.7
Estimated average crash f		crashes/yr:	80.5	0.2	0.9	5.8	23.8	49.8
Crashes by Facility	Nbr. Sites	Total	K	Α	В	С	PDO	
Freeway segments, o	crashes:	5	901.0	3.2	8.7	60.8	205.4	623.0
Ramp segments, cra	shes:	8	65.3	0.6	1.7	7.3	19.1	36.7
Crossroad ramp term	inals, crashes:	2	562.9	0.3	6.3	41.4	227.8	287.0
Crashes for Entire I	acility by Year	Year	Total	K	Α	В	С	PDO
Estimated number of	<u> </u>	2027	80.5	0.2	0.9	5.8	23.8	49.8
the Study Period, cra	3	2028	80.5	0.2	0.9	5.8	23.8	49.8
the olday i onea, ora	01100.	2029	80.5	0.2	0.9	5.8	23.8	49.8
		2030	80.5	0.2	0.9	5.8	23.8	49.8
		2030	80.5	0.2	0.9	5.8	23.8	49.8
		2031	80.5	0.2	0.9	5.8	23.8	49.8
		2033	80.5	0.2	0.9	5.8	23.8	49.8
		2034	80.5	0.2	0.9	5.8	23.8	49.8
		2035	80.5	0.2	0.9	5.8	23.8	49.8
		2036	80.5	0.2	0.9	5.8	23.8	49.8
		2037	80.5	0.2		5.8	23.8	49.8
		2038	80.5	0.2	0.9	5.8	23.8	49.8
		2039	80.5	0.2	0.9	5.8	23.8	49.8
		2040	80.5	0.2	0.9	5.8	23.8	49.8
		2041	80.5	0.2	0.9	5.8	23.8	49.8
		2042	80.5	0.2	0.9	5.8	23.8	49.8
		2043	80.5	0.2	0.9	5.8	23.8	49.8
		2044	80.5	0.2	0.9	5.8	23.8	49.8
		2045	80.5	0.2	0.9	5.8	23.8	49.8
		2046	00.0	V. <u>L</u>	0.0	0.5	20.0	10.0
		2047				+		
		2047						
		2046	+					
		2049			-			
Distribution of C	has for Entire Escil							
Distribution of Cras	nes ioi Entire Pacili	ıty	Estim-1	ad Normali	on of Cassis	oo Durdes 4	ba Ctd.	Douled
Crash Type	Crash Type C	ategory				es During t		Perioa
			Total	K	Α 0.4	В	C	
Multiple vehicle	Head-on crashes:		7.7	0.0		0.8	3.7	3.0
	Right-angle crashes:		149.5	0.1	1.8	12.1	63.6	71.9
	Rear-end crashes:		819.6	2.0		60.1	257.2	491.4
	Sideswipe crashes:		223.7	0.4		10.0	37.4	174.4
	Other multiple-vehic	cle crashes:	27.1	0.1	0.3	1.9	7.0	17.9
	Total multiple-veh	icle crashes:	1227.6	2.7	12.6	84.9	368.9	758.5
Single vehicle	Crashes with anima		3.5	0.0	0.0	0.1	0.2	3.2
5	Crashes with fixed of		219.7	1.0		17.4	58.6	139.8
	Crashes with other		26.8	0.1	0.2	1.0	3.5	22.0
	Crashes with parket		4.6	0.0		0.3	1.2	3.0
	Other single-vehicle		47.0	0.0		5.7	19.8	20.2
	Total single-vehic		301.5	1.3		24.6	83.3	188.2
	Total cra	isnes:	1529.1	4.0	16.7	109.5	452.2	946.7

Evaluation Site Summary							
General In	formation		Lvaraa	tion one o	annina y		
Project des			Managed Lanes Stu	dv 2045 No	Build I-27	0 Y from We	estlake Terrace to I-270
Analyst:		TL/PK	Date:	1/31/2022	_	Area type:	Urban
	of analysis:	2027	Total length of freewa			Period (mi)	0.720
	of analysis:	2045	İ	, ,	,	()	
Site Desci							
Freeway S							
Number	Lanes	Study Period	Study Period Descrip	tion			
		Length (mi)					
1	8	0.100	GP MP 2.00 - MP 2.10				
2	8	0.390	GP MP 1.61 -MP 2.00				
3	8	0.160	GP MP 1.44 - MP 1.61				
4	9	0.070	GP MP 1.37 - MP 1.44				
5	0	0.000	0				
6	0	0.000	0				
7	0	0.000	0				
8	0	0.000	0				
9	0	0.000	0				
10	0	0.000	0				
11	0	0.000	0				
12	0	0.000	0				
13	0	0.000	0				
14	0	0.000	0				
15	0	0.000	0				
16	0	0.000	0				
17	0	0.000	0				
18	0	0.000	0				
19	0	0.000	0				
20	Ö	0.000	0				
Ramp Seg	ments					1	
	Study Peri	od		Number	Study Peri	iod	
	Description	n			Description	n	
	H3-66 Ramp	from Westlake		21	0		
	H5-67 Ramp	from I-270 Y		22	0		
	H-68 Ramp fi	rom I-270 SB		23	0		
	0			24	0		
	0			25	0		
	0			26	0		
	0			27	0		
	0			28	0		
	0			29	0		
10	0			30	0		
	0			31	0		
	0			32	0		
	0			33	0		
	0			34	0		
	0			35	0		
	0			36	0		
	0			37	0		
_	0			38	0		
19	0			39	0		
20	O Town To	maali I		40	0		
	Ramp Te		Study Daried December	tion			
Number	Config.	Control	Study Period Descrip				
1	A2	Signal	Westlake Terrace at I-270	Y			
2	0	0	0				
3	0	0	0				
4	0	0	0				
5	0	0	0				
6	0	0	0				

		Out	put Summ	ary				
General Information	1							
Project description:	I-270 I-495 Managed	Lanes Stud	v 2045 No	Build I-27	0 Y from W	estlake Ter	race to I-27	0
Analyst:	TL/PK		1/31/2022		Area type:		Urban	
First year of analysis		12 410.	.,,		, oa. 13 p o.		<u> </u>	
Last year of analysis								
Crash Data Descrip								
Freeway segments	Segment crash data a	available?		No	First year c	of crash data	a· I	
i reeway segments	Project-level crash da		2	No		of crash data		
Ramp segments	Segment crash data			No		of crash data		
ramp segments	Project-level crash da		.2	No				
Damen tamainala	,			No	Last year of crash data: First year of crash data:			
Ramp terminals	Segment crash data a Project-level crash da		.2	No		of crash data		
Estimated Crash St	-	ila avallable		NO	Last year o	ii Crasii uata	3.	
			Tatal	1/				DDO
Crashes for Entire			Total	K	A	В	С	PDO
	hes during Study Period, cras		864.7	3.7	9.0	64.6	203.6	583.8
·	freq. during Study Period, cra		45.5	0.2	0.5	3.4	10.7	30.7
Crashes by Facility		Nbr. Sites	Total	K	Α	В	С	PDO
Freeway segments,		4	741.7	3.4	7.1	53.0	163.7	514.6
Ramp segments, cra		3	27.4	0.3		4.4	7.4	14.5
Crossroad ramp term		1	95.7	0.0	1.2	7.2	32.5	54.8
Crashes for Entire	Facility by Year	Year	Total	K	Α	В	С	PDO
Estimated number of		2027	45.5	0.2	0.5	3.4	10.7	30.7
the Study Period, cra	ishes:	2028	45.5	0.2		3.4	10.7	30.7
,		2029	45.5	0.2		3.4	10.7	30.7
		2030	45.5	0.2		3.4	10.7	30.7
		2031	45.5	0.2		3.4	10.7	30.7
		2032	45.5	0.2		3.4	10.7	30.7
		2033	45.5	0.2		3.4	10.7	30.7
		2034	45.5	0.2		3.4	10.7	30.7
		2035	45.5	0.2		3.4	10.7	30.7
		2036	45.5	0.2		3.4	10.7	30.7
		2037	45.5	0.2		3.4	10.7	30.7
		2037	45.5	0.2	0.5	3.4	10.7	30.7
		2039	45.5	0.2	0.5	3.4	10.7	30.7
		2040	45.5	0.2		3.4	10.7	30.7
		2041	45.5	0.2	0.5	3.4	10.7	30.7
		2042	45.5	0.2		3.4	10.7	30.7
		2043	45.5	0.2		3.4	10.7	30.7
		2044	45.5	0.2	0.5	3.4	10.7	30.7
		2045	45.5	0.2	0.5	3.4	10.7	30.7
		2046		_				
		2047						
		2048						
		2049						
		2050						
Distribution of Cras	shes for Entire Facility	/						
Crook Turns	Crook Turns On	io a o m :	Estima	ted Numb	er of Crash	es During	the Study	Period
Crash Type	Crash Type Cat	egory	Total	K	Α	В	С	PDO
Multiple vehicle	Head-on crashes:		2.8	0.0	0.1	0.4	1.3	1.1
•	Right-angle crashes:		34.7	0.1	0.5	3.0	12.0	19.2
	Rear-end crashes:		443.2	1.9		33.3	108.5	294.9
	Sideswipe crashes:		147.2	0.4		7.2	22.6	116.0
	Other multiple-vehicle	crashes:	15.7	0.1	0.2	1.3	3.9	10.2
	Total multiple-vehic		643.6	2.5		45.1	148.2	441.5
Single vehicle	Crashes with animal:		2.9	0.0		0.1	0.2	2.6
onigio veriloie	Crashes with fixed ob		159.3	0.0		13.9	39.5	103.1
	Crashes with other of		23.0	0.1	0.1	0.9	2.7	19.3
	Crashes with parked		3.4	0.0		0.3	0.8	2.3
	Other single-vehicle of		32.5	0.3		4.3	12.2	15.0
	Total single-vehicle Total crasl		221.1 864.7	1.2 3.7	2.8 9.0	19.4 64.6	55.4 203.6	142.4 583.8

			E	valuati	on Site S	ummary			
	formation								
Project des	scription:		Managed Lane						Blvd to Westlake Terra
Analyst:		TL/PK	Date		1/31/2022		Area type:		Urban
First year o	of analysis:	2027	Total length of f	reeway	/ segment	s for Study		0.340)
Last year o	of analysis:	2045							
Site Desci	ription								
Freeway S									
Number	Lanes	Study Period	Study Period De	escripti	on				
		Length (mi)	,	•					
1	9	0.150	GP MP 1.22 - MP 1	.37					
2	7	0.190	GP MP 1.03 - MP 1						
3	0	0.000	0						
4	0	0.000	0						
5	0	0.000	0						
6	0	0.000	0						
7	Ő	0.000	0						
8	0	0.000	0]		
9	0	0.000	0						
10	0	0.000	0]		
11	0	0.000	0]		
12	0	0.000	0						
13	0	0.000	0]		
13	0	0.000	0]		
15	0	0.000	0						
16	0	0.000	0						
17	0	0.000	0						
18	0	0.000	0						
19	0	0.000	0						
20	0	0.000	0						
Ramp Seg		0.000	O .						
	Study Peri	od		1	Number	Study Peri	nd		
Number	Description				Number	Description			
1		rom I-270 Y N			21	0			
2		rom Democra			22	0			
3	-	rom Democra			23	0			
4	-	rom I-270 Y N			24	0			
5	-	rom I-270 Y N			25	0			
6	-	rom Democra			26	0			
7	-	rom Democra			27	0			
8	-	rom Democra			28	0			
9	-	rom I-270 Y S			29	0			
	0	, 0 . 0			30	0			
11	_	from I-270 Y			31	0			
12	0	, • 1			32	0			
	0				33	0			
14	0				34	0			
15	0				35	0			
16	0				36	0			
17	0				37	0			
18	0				38	0			
19	0				39	0			
20	0				40	0			
	d Ramp Te	rminals	<u> </u>			I			
Number	Config.	Control	Study Period De	escripti	on				
1	D3ex	Signal	Democracy Bouleva	ard at I o	70V NP				
2	D3ex D4	Signal							
3	0	Signal 0	Democracy Bouleva	aru at 1-2	IUI OB				
4	0	0	0						
5	0	0	0						
6	0	0	ŭ]		
Ü	U	U	0				l		

		Out	put Summ	arv				
General Information	1			· ,				
Project description:	I-270 I-495 Managed	Lanes Stud	v 2045 No	Build I-27	0 Y from De	emocracy B	lvd to West	lake Terra
Analyst:	TL/PK		1/31/2022		Area type:		Urban	
First year of analysis		1						
Last year of analysis								
Crash Data Descrip								
Freeway segments	Segment crash data a	availahle?	Ī	No	First vear	of crash data	a·	
i reeway segments	Project-level crash da		.2	No		of crash data		
Damen as succeeds	-		11					
Ramp segments	Segment crash data a		0	No	,	of crash data		
	Project-level crash da		?	No		of crash data		
Ramp terminals	Segment crash data a		_	No		of crash data		
	Project-level crash da	ita available	?	No	Last year c	of crash data	a:	
Estimated Crash St								
Crashes for Entire I	Facility		Total	K	Α	В	С	PDO
Estimated number of crash	nes during Study Period, cras	shes:	757.3	2.0	9.1	57.7	223.7	464.9
Estimated average crash f	shes/yr:	39.9	0.1	0.5	3.0	11.8	24.5	
Crashes by Facility	Component	Nbr. Sites	Total	K	Α	В	С	PDO
Freeway segments, o		2	296.2	1.3	3.0	21.5	65.1	205.3
Ramp segments, cra		10	49.3	0.5	1.6	7.8	12.1	27.3
Crossroad ramp term		2	411.9	0.3	4.5	28.4	146.4	232.4
Crashes for Entire		Year	Total	K	Α 4.5	В	C	PDO
						_		
Estimated number of	•	2027	39.9	0.1	0.5	3.0	11.8	24.5
the Study Period, cra	snes:	2028	39.9	0.1	0.5	3.0	11.8	24.5
		2029	39.9	0.1	0.5	3.0	11.8	24.5
		2030	39.9	0.1	0.5	3.0	11.8	24.5
		2031	39.9	0.1	0.5	3.0	11.8	24.5
		2032	39.9	0.1	0.5	3.0	11.8	24.5
		2033	39.9	0.1	0.5	3.0	11.8	24.5
		2034	39.9	0.1	0.5	3.0	11.8	24.5
		2035	39.9	0.1	0.5	3.0	11.8	24.5
		2036	39.9	0.1	0.5	3.0	11.8	24.5
		2037	39.9	0.1	0.5	3.0	11.8	24.5
		2038	39.9	0.1	0.5	3.0	11.8	24.5
		2039	39.9	0.1	0.5	3.0	11.8	24.5
		2040	39.9	0.1	0.5	3.0	11.8	24.5
		2041	39.9	0.1	0.5	3.0	11.8	24.5
		2041		0.1	0.5		11.8	24.5
		2042	39.9			3.0		
			39.9	0.1	0.5	3.0	11.8	24.5
		2044	39.9	0.1	0.5	3.0	11.8	24.5
		2045	39.9	0.1	0.5	3.0	11.8	24.5
		2046						
		2047						
		2048						
		2049						
		2050						
Distribution of Cras	hes for Entire Facility	/						
Cuach Tuna	Creek Tune Cet		Estima	ted Numb	er of Crash	es During	the Study	Period
Crash Type	Crash Type Cat	egory	Total	K	Α	В	С	PDO
	Hand on avantage		4.5	0.0	0.1	0.4	2.0	2.0
Multiple vehicle	Head-on crashes:					7.9	39.5	54.1
Multiple vehicle			102.7	0.1	1.2	7.91	00.01	
Multiple vehicle	Right-angle crashes:		102.7 400.5					
Multiple vehicle	Right-angle crashes: Rear-end crashes:		400.5	0.8	4.5	30.1	128.0	237.0
Multiple vehicle	Right-angle crashes: Rear-end crashes: Sideswipe crashes:	crashes.	400.5 99.9	0.8 0.2	4.5 0.6	30.1 4.1	128.0 14.9	237.0 80.1
Multiple vehicle	Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle		400.5 99.9 12.8	0.8 0.2 0.0	4.5 0.6 0.1	30.1 4.1 0.9	128.0 14.9 2.9	237.0 80.1 8.8
	Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehic		400.5 99.9 12.8 620.4	0.8 0.2 0.0 1.2	4.5 0.6 0.1 6.6	30.1 4.1 0.9 43.4	128.0 14.9 2.9 187.3	237.0 80.1 8.8 382.0
Multiple vehicle Single vehicle	Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehic Crashes with animal:	le crashes:	400.5 99.9 12.8 620.4 1.2	0.8 0.2 0.0 1.2 0.0	4.5 0.6 0.1 6.6 0.0	30.1 4.1 0.9 43.4 0.0	128.0 14.9 2.9 187.3 0.1	237.0 80.1 8.8 382.0
	Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehic Crashes with animal: Crashes with fixed ob	le crashes: ject:	400.5 99.9 12.8 620.4 1.2 101.0	0.8 0.2 0.0 1.2 0.0 0.6	4.5 0.6 0.1 6.6 0.0 1.8	30.1 4.1 0.9 43.4 0.0 10.1	128.0 14.9 2.9 187.3 0.1 25.3	237.0 80.1 8.8 382.0 1.1 63.3
	Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehic Crashes with animal: Crashes with fixed ob	le crashes: oject:	400.5 99.9 12.8 620.4 1.2 101.0 9.8	0.8 0.2 0.0 1.2 0.0 0.6 0.0	4.5 0.6 0.1 6.6 0.0 1.8 0.1	30.1 4.1 0.9 43.4 0.0 10.1	128.0 14.9 2.9 187.3 0.1 25.3	237.0 80.1 8.8 382.0 1.1 63.3 8.0
	Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehic Crashes with animal: Crashes with fixed ob Crashes with other ob Crashes with parked	le crashes: vehicle:	400.5 99.9 12.8 620.4 1.2 101.0 9.8 2.3	0.8 0.2 0.0 1.2 0.0 0.6 0.0	4.5 0.6 0.1 6.6 0.0 1.8 0.1	30.1 4.1 0.9 43.4 0.0 10.1 0.5	128.0 14.9 2.9 187.3 0.1 25.3 1.3 0.5	237.0 80.1 8.8 382.0 1.1 63.3 8.0
	Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehic Crashes with animal: Crashes with fixed ob Crashes with other ob Crashes with parked Other single-vehicle of	le crashes: ject: pject: vehicle: crashes	400.5 99.9 12.8 620.4 1.2 101.0 9.8 2.3 22.7	0.8 0.2 0.0 1.2 0.0 0.6 0.0 0.0	4.5 0.6 0.1 6.6 0.0 1.8 0.1 0.0 0.0	30.1 4.1 0.9 43.4 0.0 10.1 0.5 0.2 3.5	128.0 14.9 2.9 187.3 0.1 25.3 1.3 0.5 9.2	237.0 80.1 8.8 382.0 1.1 63.3 8.0 1.5
	Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehic Crashes with animal: Crashes with fixed ob Crashes with other ob Crashes with parked	le crashes: ject: ject: vehicle: crashes crashes:	400.5 99.9 12.8 620.4 1.2 101.0 9.8 2.3	0.8 0.2 0.0 1.2 0.0 0.6 0.0	4.5 0.6 0.1 6.6 0.0 1.8 0.1 0.0 0.6 2.5	30.1 4.1 0.9 43.4 0.0 10.1 0.5	128.0 14.9 2.9 187.3 0.1 25.3 1.3 0.5	237.0 80.1 8.8 382.0 1.1 63.3 8.0

	Evaluation Site Summary							
General In	formation		Evalua	tion one o	anima y			
Project des			outh I-270Y from I-495	to Democ	racy Boulev	/ard		
Analyst:		PK	Date:	1/31/2022		Area type:	Urban	
First year o	of analysis:	2027	Total length of freewa			Period (mi)	1.030	
	of analysis:	2045	İ	, ,	,	` '		
Site Desci								
Freeway S								
Number	Lanes	Study Period	Study Period Descrip	tion				
		Length (mi)						
1	6	0.060	GP MP 0.00 - MP 0.06					
2	6	0.370	GP MP 0.06 - MP 0.43					
3	7	0.390	GP MP 0.43 - MP 0.82					
4	7	0.040	GP MP 0.82 - MP 0.86					
5	7	0.130	GP MP 0.86 - MP 0.99					
6	7	0.040	GP MP 0.99 - MP 1.03					
7	0	0.000	0					
8	0	0.000	0					
9	0	0.000	0					
10	0	0.000	0					
11	0	0.000	0					
12	0	0.000	0					
13	0	0.000	0					
14	0	0.000	0					
15	0	0.000	0					
16	0	0.000	0					
17	0	0.000	0					
18	0	0.000	0					
19	0	0.000	0					
20	0	0.000	0					
Ramp Seg	ments		<u> </u>					
	Study Peri	od		Number	Study Peri	od		
	Description				Description			
1	0			21	0			
	0			22	0			
	0			23	0			
	0			24	0			
	0			25	0			
	0			26	0			
	0			27	0			
	0			28	0			
	0			29	0			
10	0			30	0			
	0			31	0			
	0			32	0			
	0			33	0			
	0			34	0			
	0			35	0			
	0			36	0			
	0			37	0			
_	0			38	0			
19	0			39	0			
20	0 1 D = T =			40	0			
	Ramp Te		Ottobal Date 1 1 1 2 1 1 1 2 1 1 1 2 1 1 1 2 1	4:		1		
Number	Config.	Control	Study Period Descrip	tion				
1	0	0	0					
2	0	0	0					
3	0	0	0					
4	0	0	0					
5	0	0	0					
6	0	0	0					

		Qut	put Summa	rv				
General Informatio	n	- Cut	put Guilline	ii y				
Project description:	Phase 1 South I-27	0Y from I-495	to Democra	cv Boulev	ard			
Analyst:	PK		1/31/2022		Area type:	Ti.	Jrban	
First year of analysis		Date.	170172022		riiou typo.		, Dan	
Last year of analysis								
Crash Data Descrip								
		a available?		No	Circt year o	f araah data		
Freeway segments	Segment crash data		_		,	f crash data		
	Project-level crash		?	No	•	f crash data		
Ramp segments	Segment crash data			No		f crash data		
	Project-level crash		?	No		f crash data		
Ramp terminals	Segment crash data			No		f crash data		
	Project-level crash	data available	?	No	Last year of	f crash data	:	
Estimated Crash S	tatistics							
Crashes for Entire	Facility		Total	K	Α	В	С	PDO
Estimated number of cras	hes during Study Period, c	rashes:	855.6	2.5	7.1	50.5	197.4	598.0
	freq. during Study Period, of		45.0	0.1	0.4	2.7	10.4	31.5
Crashes by Facility		Nbr. Sites	Total	K	Α	В	С	PDO
Freeway segments,	•	6	855.6	2.5		50.5	197.4	598.0
		0	0.0	0.0	0.0	0.0	0.0	
Ramp segments, cra		0	0.0					0.0
	Crossroad ramp terminals, crashes:			0.0	0.0	0.0	0.0	0.0
Crashes for Entire		Year	Total	K	Α	В	С	PDO
Estimated number o	5	2027	45.0	0.1	0.4	2.7	10.4	31.5
the Study Period, cra	ashes:	2028	45.0	0.1	0.4	2.7	10.4	31.5
		2029	45.0	0.1	0.4	2.7	10.4	31.5
		2030	45.0	0.1	0.4	2.7	10.4	31.5
		2031	45.0	0.1	0.4	2.7	10.4	31.5
		2032	45.0	0.1	0.4	2.7	10.4	31.5
		2033	45.0	0.1	0.4	2.7	10.4	31.5
		2034	45.0	0.1	0.4	2.7	10.4	31.5
		2035	45.0	0.1	0.4	2.7	10.4	31.5
					_			
		2036	45.0	0.1	0.4	2.7	10.4	31.5
		2037	45.0	0.1	0.4	2.7	10.4	31.5
		2038	45.0	0.1	0.4	2.7	10.4	31.5
		2039	45.0	0.1	0.4	2.7	10.4	31.5
		2040	45.0	0.1	0.4	2.7	10.4	31.5
		2041	45.0	0.1	0.4	2.7	10.4	31.5
		2042	45.0	0.1	0.4	2.7	10.4	31.5
		2043	45.0	0.1	0.4	2.7	10.4	31.5
		2044	45.0	0.1	0.4	2.7	10.4	31.5
		2045	45.0	0.1	0.4	2.7	10.4	31.5
		2045	70.0	0.1	0.4	2.1	10.4	31.3
						+	+	
		2047					+	
		2048					-	
		2049						
		2050						
Distribution of Cras	shes for Entire Facil							
		ity				es During t		
Crash Type	shes for Entire Facil Crash Type C	ity	Estimat Total	K	Α	В	he Study I	Period PDO
	Crash Type C Head-on crashes:	ity ategory						
Crash Type	Crash Type C	ity ategory	Total	K	Α	В	С	PDO
Crash Type	Crash Type C Head-on crashes:	ity ategory	Total 2.4	K	0.0 0.2	B 0.3	C 1.1	PDO 0.9
Crash Type	Crash Type C Head-on crashes: Right-angle crashes Rear-end crashes:	ity ategory	7otal 2.4 14.0 468.3	0.0 0.1	A 0.0	0.3 1.1	1.1 4.2	PDO 0.9 8.5
Crash Type	Crash Type C Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes:	ategory	Total 2.4 14.0 468.3 159.6	0.0 0.1 1.4 0.3	0.0 0.2 3.9 1.0	B 0.3 1.1 27.9 6.8	1.1 4.2 109.0 26.6	9DO 0.9 8.5 326.2 124.9
Crash Type	Crash Type C Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehice	ategory s:	Total 2.4 14.0 468.3 159.6 16.5	0.0 0.1 1.4 0.3 0.1	0.0 0.2 3.9 1.0 0.2	B 0.3 1.1 27.9 6.8 1.1	1.1 4.2 109.0 26.6 4.3	9DO 0.9 8.5 326.2 124.9 10.9
Crash Type Multiple vehicle	Crash Type C Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehic Total multiple-veh	ategory s: cle crashes: icle crashes:	2.4 14.0 468.3 159.6 16.5 660.8	0.0 0.1 1.4 0.3 0.1 1.9	0.0 0.2 3.9 1.0 0.2 5.2	B 0.3 1.1 27.9 6.8 1.1 37.1	1.1 4.2 109.0 26.6 4.3 145.2	9DO 0.9 8.5 326.2 124.9 10.9 471.5
Crash Type Multiple vehicle	Crash Type C Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehic Total multiple-veh Crashes with anima	ategory s: cle crashes: icle crashes:	7otal 2.4 14.0 468.3 159.6 16.5 660.8 2.9	0.0 0.1 1.4 0.3 0.1 1.9	0.0 0.2 3.9 1.0 0.2 5.2 0.0	B 0.3 1.1 27.9 6.8 1.1 37.1	1.1 4.2 109.0 26.6 4.3 145.2 0.2	9DO 0.9 8.5 326.2 124.9 10.9 471.5
Crash Type	Crash Type C Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehic Total multiple-veh Crashes with anima Crashes with fixed of	ategory ategory cle crashes: icle crashes: il: object:	7otal 2.4 14.0 468.3 159.6 16.5 660.8 2.9 140.2	0.0 0.1 1.4 0.3 0.1 1.9 0.0	0.0 0.2 3.9 1.0 0.2 5.2 0.0	B 0.3 1.1 27.9 6.8 1.1 37.1 0.0 9.6	1.1 4.2 109.0 26.6 4.3 145.2 0.2 37.6	9DO 0.9 8.5 326.2 124.9 10.9 471.5 2.7 91.1
Crash Type Multiple vehicle	Crash Type C Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehic Total multiple-veh Crashes with anima Crashes with fixed of Crashes with other	ategory s: cle crashes: icle crashes: il: object: object:	2.4 14.0 468.3 159.6 16.5 660.8 2.9 140.2 21.6	0.0 0.1 1.4 0.3 0.1 1.9 0.0 0.5	0.0 0.2 3.9 1.0 0.2 5.2 0.0 1.3 0.1	8 0.3 1.1 27.9 6.8 1.1 37.1 0.0 9.6 0.7	1.1 4.2 109.0 26.6 4.3 145.2 0.2 37.6 2.8	9DO 0.9 8.5 326.2 124.9 10.9 471.5 2.7 91.1
Crash Type Multiple vehicle	Crash Type C Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehic Total multiple-veh Crashes with anima Crashes with other Crashes with other Crashes with parke	ategory cle crashes: icle crashes: il: object: d vehicle:	70tal 2.4 14.0 468.3 159.6 16.5 660.8 2.9 140.2 21.6 2.8	0.0 0.1 1.4 0.3 0.1 1.9 0.0	0.0 0.2 3.9 1.0 0.2 5.2 0.0 1.3 0.1	8 0.3 1.1 27.9 6.8 1.1 37.1 0.0 9.6 0.7	1.1 4.2 109.0 26.6 4.3 145.2 0.2 37.6	900 0.9 8.5 326.2 124.9 10.9 471.5 2.7 91.1 17.9
Crash Type Multiple vehicle	Crash Type C Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehic Total multiple-veh Crashes with anima Crashes with fixed of Crashes with other	ategory cle crashes: icle crashes: il: object: d vehicle:	2.4 14.0 468.3 159.6 16.5 660.8 2.9 140.2 21.6	0.0 0.1 1.4 0.3 0.1 1.9 0.0 0.5	0.0 0.2 3.9 1.0 0.2 5.2 0.0 1.3 0.1	8 0.3 1.1 27.9 6.8 1.1 37.1 0.0 9.6 0.7	1.1 4.2 109.0 26.6 4.3 145.2 0.2 37.6 2.8	900 0.9 8.5 326.2 124.9 10.9 471.5 2.7 91.1 17.9
Crash Type Multiple vehicle	Crash Type C Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehic Total multiple-veh Crashes with anima Crashes with other Crashes with other Crashes with parke	ategory cle crashes: icle crashes: il: object: d vehicle: e crashes	70tal 2.4 14.0 468.3 159.6 16.5 660.8 2.9 140.2 21.6 2.8	0.0 0.1 1.4 0.3 0.1 1.9 0.0 0.5 0.0	0.0 0.2 3.9 1.0 0.2 5.2 0.0 1.3 0.1	8 0.3 1.1 27.9 6.8 1.1 37.1 0.0 9.6 0.7	1.1 4.2 109.0 26.6 4.3 145.2 0.2 37.6 2.8 0.7	9DO 0.9 8.5 326.2 124.9 10.9 471.5 2.7 91.1

Evaluation Site Summary								
General In	nformation			3.1.5				
Project des			Study Limit to George	Washington	n Memorial	Parkway Int	erchange	
Analyst:	bonpuon.	PK	Date:	1/31/2022		Area type:		Urban
	of analysis:	2027	Total length of freewa				1.350	J. Dali
	of analysis:	2045	Traditioning in or need we	ay sognioni	o ioi oluuy	. chod (iiii)	1.550	
Site Desci		2040						
Freeway S								
	_		O44 D1 - 4 D1	4:				
Number	Lanes	-	Study Period Descrip	ition				
		Length (mi)						
1	10	0.250	GP MP 13.72 - MP 13.97					
2	9	0.010	GP MP 13.97 - MP 13.97					
3	9	0.180	GP MP 13.97 - MP 14.15					
4	8	0.020	GP MP 14.15 - MP 14.17					
5	8	0.190	GP MP 14.15 - MP 14.17					
6	9	0.180	GP MP 14.36 - MP 14.54					
7	9	0.200	GP MP 14.54 - MP 14.74					
8	9	0.110	GP MP 14.74 - MP 14.85					
9	8	0.050	GP MP 14.85 - MP 14.90					
10	8	0.080	GP MP 14.90 - MP 14.98					
11	8	0.080	GP MP 14.98 - MP 15.06					
12	0	0.000	0					
13		0.000						
	0		0					
14 15	0	0.000	0					
15	0	0.000	0					
16	0	0.000	0					
17	0	0.000	0					
18	0	0.000	0					
19	0	0.000	0					
20	0	0.000	0					
Ramp Seg						-		
Number	Study Peri	od		Number	Study Peri	iod		
	Description	1			Descriptio	n		
1	SB CD-1 I-49	5 SB		21	0		-	
	SB CD-2 I-49	5 SB		22	0			
3	Ramp from V	A 193 WB to		23	0			
4	Ramp from V	A 193 WB to		24	0			
5	Ramp from V	A 193 WB to		25	0			
	Ramp from I-			26	0			
_	Ramp from I-				U	ļ.		<u> </u>
8	· ·			27				
_	,	495 NB to VA		27 28	0			
9	Ramp from I-	495 NB to VA 495 SB GP to		28	0 0			
	Ramp from I-			28 29	0			
10	0			28 29 30	0 0 0 0			
10 11	0			28 29 30 31	0 0 0 0			
10 11 12	0 0 0			28 29 30 31 32	0 0 0 0 0			
10 11 12 13	0 0 0 0			28 29 30 31 32 33	0 0 0 0 0 0			
10 11 12 13 14	0 0 0 0 0			28 29 30 31 32 33 34	0 0 0 0 0 0 0 0			
10 11 12 13 14 15	0 0 0 0 0			28 29 30 31 32 33 34 35	0 0 0 0 0 0 0 0			
10 11 12 13 14 15	0 0 0 0 0			28 29 30 31 32 33 34 35 36	0 0 0 0 0 0 0 0			
10 11 12 13 14 15 16	0 0 0 0 0			28 29 30 31 32 33 34 35 36 37	0 0 0 0 0 0 0 0			
10 11 12 13 14 15 16 17	0 0 0 0 0 0			28 29 30 31 32 33 34 35 36 37 38	0 0 0 0 0 0 0 0 0			
10 11 12 13 14 15 16 17 18	0 0 0 0 0 0 0			28 29 30 31 32 33 34 35 36 37	0 0 0 0 0 0 0 0 0 0			
10 11 12 13 14 15 16 17 18 19 20	0 0 0 0 0 0 0 0 0	495 SB GP to		28 29 30 31 32 33 34 35 36 37 38	0 0 0 0 0 0 0 0 0 0 0			
10 11 12 13 14 15 16 17 18 19 20	0 0 0 0 0 0 0 0 0	495 SB GP to		28 29 30 31 32 33 34 35 36 37 38 39	0 0 0 0 0 0 0 0 0 0 0			
10 11 12 13 14 15 16 17 18 19 20	0 0 0 0 0 0 0 0 0	495 SB GP to		28 29 30 31 32 33 34 35 36 37 38 39 40	0 0 0 0 0 0 0 0 0 0 0			
10 11 12 13 14 15 16 17 18 19 20 Crossroad	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	rminals Control	Study Period Descrip	28 29 30 31 32 33 34 35 36 37 38 39 40	0 0 0 0 0 0 0 0 0 0 0			
10 11 12 13 14 15 16 17 18 19 20 Crossroad Number	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	rminals Control Signal	Study Period Descrip VA 193 at I-495 NB	28 29 30 31 32 33 34 35 36 37 38 39 40	0 0 0 0 0 0 0 0 0 0 0			
10 11 12 13 14 15 16 17 18 19 20 Crossroad Number	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	rminals Control Signal Signal	Study Period Descrip VA 193 at I-495 NB VA 193 at I-495 SB	28 29 30 31 32 33 34 35 36 37 38 39 40	0 0 0 0 0 0 0 0 0 0 0			
10 11 12 13 14 15 16 17 18 19 20 Crossroad Number	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	rminals Control Signal Signal 0	Study Period Descrip VA 193 at I-495 NB VA 193 at I-495 SB 0	28 29 30 31 32 33 34 35 36 37 38 39 40	0 0 0 0 0 0 0 0 0 0 0			
10 11 12 13 14 15 16 17 18 19 20 Crossroad Number	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	rminals Control Signal Signal 0 0	Study Period Descrip VA 193 at I-495 NB VA 193 at I-495 SB	28 29 30 31 32 33 34 35 36 37 38 39 40	0 0 0 0 0 0 0 0 0 0 0			
10 11 12 13 14 15 16 17 18 19 20 Crossroad Number	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	rminals Control Signal Signal 0	Study Period Descrip VA 193 at I-495 NB VA 193 at I-495 SB 0	28 29 30 31 32 33 34 35 36 37 38 39 40	0 0 0 0 0 0 0 0 0 0 0			

		Out	put Summa	arv				
General Information			put Guilline	<u>y</u>				
Project description:	Southern Study Lim	it to George V	Vashington	Memorial	Parkway Into	erchange		
Analyst:	PK		1/31/2022		Area type:		Jrban	
First year of analysis:		Date.	1/01/2022		Alca type.		JI Dali	
Last year of analysis:								
Crash Data Descrip		: - - -0		NI-	F:4	£ll-4-	. 1	
Freeway segments	Segment crash data			No	First year of crash data: Last year of crash data:			
	Project-level crash		?	No				
Ramp segments	Segment crash data	a available?	No First year of crash data:			:		
	Project-level crash	data available	?	No	Last year of	f crash data		
Ramp terminals	Segment crash data	a available?		No	First year of	f crash data	:	
	Project-level crash	data available	?	No	Last year of	f crash data	:	
Estimated Crash Sta	atistics							
Crashes for Entire F	acility		Total	K	Α	В	С	PDO
Estimated number of crash	nes during Study Period o	rashes	2070.9	7.2	22.6	126.4	456.2	1458.4
Estimated average crash fi			109.0	0.4	1.2	6.7	24.0	76.8
Crashes by Facility		Nbr. Sites	Total	K	Α	В	С	PDO
Freeway segments, o	•	11	1597.2	6.5		98.8	336.9	1137.0
Ramp segments, cra		9	107.5	0.5	2.1	10.4	24.6	69.8
		2	366.3	0.7	2.1	17.2	94.7	251.6
Crossroad ramp term							_	
Crashes for Entire F	<u> </u>	Year	Total	K	Α	В	С	PDO
Estimated number of	5	2027	109.0	0.4	1.2	6.7	24.0	76.8
the Study Period, cra	shes:	2028	109.0	0.4		6.7	24.0	76.8
		2029	109.0	0.4	1.2	6.7	24.0	76.8
		2030	109.0	0.4	1.2	6.7	24.0	76.8
		2031	109.0	0.4	1.2	6.7	24.0	76.8
		2032	109.0	0.4	1.2	6.7	24.0	76.8
		2033	109.0	0.4		6.7	24.0	76.8
		2034	109.0	0.4	1.2	6.7	24.0	76.8
		2035	109.0	0.4	1.2	6.7	24.0	76.8
		2036	109.0	0.4	1.2	6.7	24.0	76.8
		2037	109.0	0.4		6.7	24.0	76.8
		2038	109.0	0.4	1.2	6.7	24.0	76.8
		2039	109.0	0.4	1.2	6.7	24.0	76.8
		2040	109.0	0.4	1.2	6.7	24.0	76.8
		2041	109.0	0.4	1.2	6.7	24.0	76.8
		2042	109.0	0.4	1.2	6.7	24.0	76.8
		2043	109.0	0.4	1.2	6.7	24.0	76.8
		2044	109.0	0.4	1.2	6.7	24.0	76.8
		2045	109.0	0.4	1.2	6.7	24.0	76.8
		2045	103.0	0.4	1.2	0.7	24.0	70.0
			-					
		2047	+					
		2048	+				-	
		2049						
		2050						
Distribution of Cras	nes for Entire Facil	ity						
Crash Type	Crash Type C	ategory			er of Crash			
	Siddii Type C	y	Total	K	Α	В	С	PDO
Multiple vehicle	Head-on crashes:		7.9	0.0	0.1	8.0	3.0	3.8
	Right-angle crashes	s:	112.0	0.2	1.1	6.6	31.9	72.2
	Rear-end crashes:		1136.5	4.0	12.5	70.7	260.6	788.7
	Sideswipe crashes:		368.9	1.0	2.8	15.3	53.3	296.5
	Other multiple-vehic		42.4	0.2		2.9	9.5	29.3
	Total multiple-veh		1667.6	5.3	17.0	96.4	358.3	1190.6
	Crashes with anima			0.0		0.1	0.2	
Single vehicle			4.8 294.0		0.0			4.5
Single vehicle				1.4	4.0	21.4	69.3	198.0
Single vehicle	Crashes with fixed							
Single vehicle	Crashes with fixed of Crashes with other	object:	41.3	0.1	0.3	1.5	5.0	34.6
Single vehicle	Crashes with fixed of Crashes with other Crashes with parke	object: d vehicle:	41.3 5.4		0.3 0.1	1.5 0.4	5.0 1.2	34.6 3.7
Single vehicle	Crashes with fixed of Crashes with other Crashes with parke Other single-vehicle	object: d vehicle: e crashes	41.3	0.1	0.1	0.4 6.8	5.0	
Single vehicle	Crashes with fixed of Crashes with other Crashes with parke	object: d vehicle: e crashes	41.3 5.4	0.1 0.0	0.1 1.3	0.4	5.0 1.2	3.7

Commons Comm				Fyaluat	tion Site S	ummary			
Project description: GWMP Interchange to Maryland Stateline	General In	formation		Evalua	tion one o	aiiiiiai y			
Analysts PK				erchange to Maryland	Stateline				
Circle Variety Company Compa							Area type:	Urhan	
Last year of analysis 2045 Sike Description			2027				Period (mi)		
Number				i otariongarornoowa	ly obgillorit	o loi Olday	r crica (iiii)	0.000	
Number Lanes Study Period Description			2010						
Number Lanes Study Period Description Length (m)									
Length (m)			Ctudy Dariad	Study Pariod Descript	tion		T		
1	Number	Lailes		Study Fellou Descrip	lion				
2	- 1	0		Dames from 1 405 ND ML to	CWMD ED				•
3				· ·	GWIVIP ED				
4									
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10									
11									
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Ramp Segments									
Number Study Period Description Desc									
Number	_	•	0.000	0					
Description			- d		Nimakan	Ctudy Dav	: a al		
1	Number				Number				
Ramp from I-495 NB Mc ar 3	1				21		11		
3						_			
A									
S									
6 Ramp from GWMP WB to 26 0 0 7 Ramp from I-495 NB ML to 27 0 0 8 Ramp from GWMP WB to 28 0 9 0 29 0 10 0 31 0 0 11 0 0 31 0 0 12 0 32 0 0 13 0 0 14 0 34 0 0 15 0 0 35 0 0 16 0 0 0 0 0 0 0 0 0 0									
7 Ramp from I-495 NB ML to 8 Ramp from GWMP WB to I 9 0 10 0 11 0 11 0 12 0 13 0 14 0 15 0 16 0 17 0 18 0 19 0 20 0 19 0 30 0 31 0 31 0 32 0 33 0 44 0 36 0 37 0 38 0 39 0 20 0 Crossroad Ramp Terminals Number Config. Control Study Period Description 1 0 0 0 2 0 0 0 2 0 0 0 3 0 0 3 0 0 3 0 0 3 0 0 3 0 0 3 0 0 3 0 0 3 0 0 3 0 0 3 0 0 3 0 0 4 0 0 5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		-				-			
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Crossroad Ramp Terminals Number Config. Control Study Period Description 1 0 0 0 2 0 0 0 3 0 0 0 4 0 0 0 5 0 0 0		_				_			
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2				Study Period Descrip	tion				
2	1	0	0	0					
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		Out	put Summa	ırv				
General Information	1							
Project description:	GWMP Interchange to	o Maryland	Stateline					
Analyst:	PK		1/31/2022		Area type:		Urban	
First year of analysis		1						
Last year of analysis								
Crash Data Descrip								
Freeway segments	Segment crash data	availahle?		No	First vear	of crash dat	a·	
i reeway segments	Project-level crash da		.2	No				
Damen as sumanta	-) f		Last year of crash data: First year of crash data:			
Ramp segments	Segment crash data a		_	No	,			
	Project-level crash da		17	No	Last year of crash data: First year of crash data:			
Ramp terminals	Segment crash data a			No				
	Project-level crash da	ita available	?	No	Last year c	of crash data	a:	
Estimated Crash St								
Crashes for Entire I	Facility		Total	K	Α	В	С	PDO
Estimated number of crast	hes during Study Period, cra	shes:	921.0	3.7	10.7	62.1	189.6	654.8
Estimated average crash f	req. during Study Period, cra	shes/yr:	48.5	0.2	0.6	3.3	10.0	34.5
Crashes by Facility	Component	Nbr. Sites	Total	K	Α	В	С	PDO
Freeway segments, o	-	3	728.7	2.4	6.6	37.2	143.9	538.6
Ramp segments, cra		8	192.4	1.4	4.1	25.0	45.8	116.2
Crossroad ramp term		0	0.0	0.0	0.0	0.0	0.0	0.0
Crashes for Entire I	Year	Total	K	A	B	C	PDO	
Estimated number of	•	2027	48.5	0.2	0.6	3.3	10.0	34.5
the Study Period, cra	isnes:	2028	48.5	0.2	0.6	3.3	10.0	34.5
		2029	48.5	0.2	0.6	3.3	10.0	34.5
		2030	48.5	0.2	0.6	3.3	10.0	34.5
		2031	48.5	0.2	0.6	3.3	10.0	34.5
		2032	48.5	0.2	0.6	3.3	10.0	34.5
		2033	48.5	0.2	0.6	3.3	10.0	34.5
		2034	48.5	0.2	0.6	3.3	10.0	34.5
		2035	48.5	0.2	0.6	3.3	10.0	34.5
		2036	48.5	0.2	0.6	3.3	10.0	34.5
		2037	48.5	0.2	0.6	3.3	10.0	34.5
		2038	48.5	0.2	0.6	3.3	10.0	34.5
		2039	48.5	0.2	0.6	3.3	10.0	34.5
		2040	48.5	0.2	0.6	3.3	10.0	34.5
		2041	48.5	0.2	0.6	3.3	10.0	34.5
		2042	48.5	0.2	0.6	3.3	10.0	34.5
		2043	48.5	0.2	0.6	3.3	10.0	34.5
		2044	48.5	0.2	0.6	3.3	10.0	34.5
		2045	48.5	0.2	0.6	3.3	10.0	34.5
		2046						
		2047						
		2048						
		2049		-				-
		2050						
Distribution of Cras	hes for Entire Facility		L				L.	
			Estimat	ed Numb	er of Crash	es Durina	the Study	Period
A	A	OGORY				В	С	PDO
Crash Type	Crash Type Cat	egory	Total	K	Α			100
		egory						1.7
Crash Type Multiple vehicle	Head-on crashes:	egory	3.8	0.0	0.1	0.5	1.5	1.7
	Head-on crashes: Right-angle crashes:	egory	3.8 14.4	0.0 0.1	0.1 0.2	0.5 1.1	1.5 4.1	1.7 8.9
	Head-on crashes: Right-angle crashes: Rear-end crashes:	egory	3.8 14.4 529.8	0.0 0.1 2.2	0.1 0.2 6.2	0.5 1.1 35.7	1.5 4.1 114.2	1.7 8.9 371.5
	Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes:		3.8 14.4 529.8 189.9	0.0 0.1 2.2 0.5	0.1 0.2 6.2 1.4	0.5 1.1 35.7 7.9	1.5 4.1 114.2 26.1	1.7 8.9 371.5 154.0
	Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle	e crashes:	3.8 14.4 529.8 189.9 32.4	0.0 0.1 2.2 0.5 0.2	0.1 0.2 6.2 1.4 0.6	0.5 1.1 35.7 7.9 3.3	1.5 4.1 114.2 26.1 8.2	1.7 8.9 371.5 154.0 20.1
Multiple vehicle	Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehicle	e crashes:	3.8 14.4 529.8 189.9 32.4 770.3	0.0 0.1 2.2 0.5 0.2 2.9	0.1 0.2 6.2 1.4 0.6 8.5	0.5 1.1 35.7 7.9 3.3 48.6	1.5 4.1 114.2 26.1 8.2 154.1	1.7 8.9 371.5 154.0 20.1 556.2
	Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehicle Crashes with animal:	e crashes:	3.8 14.4 529.8 189.9 32.4 770.3	0.0 0.1 2.2 0.5 0.2 2.9 0.0	0.1 0.2 6.2 1.4 0.6 8.5 0.0	0.5 1.1 35.7 7.9 3.3 48.6 0.0	1.5 4.1 114.2 26.1 8.2 154.1 0.1	1.7 8.9 371.5 154.0 20.1 556.2
Multiple vehicle	Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehicle Crashes with animal: Crashes with fixed ob	e crashes: le crashes: lject:	3.8 14.4 529.8 189.9 32.4 770.3 1.9 111.5	0.0 0.1 2.2 0.5 0.2 2.9 0.0 0.6	0.1 0.2 6.2 1.4 0.6 8.5 0.0	0.5 1.1 35.7 7.9 3.3 48.6 0.0 9.7	1.5 4.1 114.2 26.1 8.2 154.1 0.1 25.6	1.7 8.9 371.5 154.0 20.1 556.2 1.7 73.9
Multiple vehicle	Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehicle Crashes with animal: Crashes with fixed ob	e crashes: le crashes: nject:	3.8 14.4 529.8 189.9 32.4 770.3 1.9 111.5	0.0 0.1 2.2 0.5 0.2 2.9 0.0 0.6	0.1 0.2 6.2 1.4 0.6 8.5 0.0 1.6	0.5 1.1 35.7 7.9 3.3 48.6 0.0 9.7 0.4	1.5 4.1 114.2 26.1 8.2 154.1 0.1 25.6 1.3	1.7 8.9 371.5 154.0 20.1 556.2 1.7 73.9
Multiple vehicle	Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehicle Crashes with animal: Crashes with fixed ob Crashes with other of Crashes with parked	e crashes: le crashes: nject: nject: vehicle:	3.8 14.4 529.8 189.9 32.4 770.3 1.9 111.5 12.2 2.2	0.0 0.1 2.2 0.5 0.2 2.9 0.0 0.6 0.0	0.1 0.2 6.2 1.4 0.6 8.5 0.0 1.6 0.1	0.5 1.1 35.7 7.9 3.3 48.6 0.0 9.7 0.4 0.2	1.5 4.1 114.2 26.1 8.2 154.1 0.1 25.6 1.3 0.5	1.7 8.9 371.5 154.0 20.1 556.2 1.7 73.9 10.4
Multiple vehicle	Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehicle Crashes with animal: Crashes with fixed ob Crashes with other of Crashes with parked Other single-vehicle of	e crashes: le crashes: lject: oject: vehicle: crashes	3.8 14.4 529.8 189.9 32.4 770.3 1.9 111.5	0.0 0.1 2.2 0.5 0.2 2.9 0.0 0.6	0.1 0.2 6.2 1.4 0.6 8.5 0.0 1.6	0.5 1.1 35.7 7.9 3.3 48.6 0.0 9.7 0.4	1.5 4.1 114.2 26.1 8.2 154.1 0.1 25.6 1.3	1.7 8.9 371.5 154.0 20.1 556.2 1.7 73.9 10.4
Multiple vehicle	Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehicle Crashes with animal: Crashes with fixed ob Crashes with other of Crashes with parked	e crashes: le crashes: lject: oject: vehicle: crashes	3.8 14.4 529.8 189.9 32.4 770.3 1.9 111.5 12.2 2.2	0.0 0.1 2.2 0.5 0.2 2.9 0.0 0.6 0.0	0.1 0.2 6.2 1.4 0.6 8.5 0.0 1.6 0.1	0.5 1.1 35.7 7.9 3.3 48.6 0.0 9.7 0.4 0.2	1.5 4.1 114.2 26.1 8.2 154.1 0.1 25.6 1.3 0.5	1.7 8.9 371.5

			Evaluat	tion Site S	ummarv		
General In	formation			tion one o	annia y		
Project des			Managed Lanes Stud	lv 2045 No	Build I-49	95 from Virgi	nia Stateline to MD 190
Analyst:		PK	Date:	1/31/2022	Dulia_ I-4	Area type:	Urban
		2027	Total length of freewa		o for Ctudy	Doried (mi)	2.370
First year o			Total length of freewa	iy segment	s for Study	Period (mi)	2.370
Last year o		2045					
Site Desci							
Freeway S	Segments						
Number	Lanes	Study Period	Study Period Descript	tion			
		Length (mi)	,				
1	10	0.330	GP MP 0.00 - MP 0.33				
2	9	0.020	GP MP 0.33 - MP 0.35				
3	8	0.130	GP MP 0.35 - MP 0.48				
4	9	0.120	GP MP 0.48 - MP 0.60				
5	9	0.260	GP MP 0.60 - MP 0.86				
6	8	0.630	GP MP 0.86 - MP 1.49				
7	9	0.340	GP MP 1.49 - MP 1.83				
8	8	0.070	GP MP 1.83 - MP 1.90				
9	8	0.290	GP MP 1.90 - MP 2.19				
10	9	0.110	GP MP 2.19 - MP 2.30				
11	10	0.110	GP MP 2.30 - MP 2.37				
12	0						
		0.000	0				
13	0	0.000	0				
14	0	0.000	0				
15	0	0.000	0				
16	0	0.000	0				
17	0	0.000	0				
18	0	0.000	0				
19	0	0.000	0				
20	0	0.000	0				
Ramp Seg	,	0.000	U				
		1		NII.	O4 - D	1	
	Study Peri			Number	Study Peri		
	Description				Descriptio	n	
1		B to CBP WB		21	0		
2	G3-1 CBP EE	3 to I-495 NB		22	0		
3	G4-1 I-495 N	B to CBP EB		23	0		
4	G4-2 I-495 N	B to CBP EB		24	0		
5	G6-1 CBP EE	3 to I-495 SB		25	0		
6	G7-1 CBP W	B to I-495 SB		26	0		
7	G7-2 CBP W			27	0		
8	G8-1 I-495 SI			28	0		
	0	C 10 ODI 11D		29	0		
					-		
	0			30	0		
	0			31	0		
	0			32	0		
_	0			33	0		
14	0			34	0		
15	0			35	0		
16	0			36	0		
17	0			37	0		
18	0			38	0		
19	0			39	0		
20	-			40	_		
	0 d Domn To	rmincl-		40	0		
	Ramp Te		0				
Number	Config.	Control	Study Period Descript	tion			
1	0	0	0				
2	0	0	0				
3	0	0	0				
4	0	0	0				
	0	0					
5			0				
6	0	0	0			Ī	

		Out	put Summ	arv				
General Information	1	Jul	pat Guilli	ч. у				
Project description:	I-270 I-495 Managed	Lanes Study	v 2045 No	Build I-49	5 from Vira	inia Statelin	e to MD 19	00
Analyst:	PK		1/31/2022		Area type:		Urban	
First year of analysis:		Date.	110112022		, aca type.		J. Dail	
Last year of analysis:								
,								
Crash Data Descript				<u> </u>	F: (
Freeway segments	Segment crash data		_	No	First year o			
	Project-level crash da		?	No		f crash data		
Ramp segments	Segment crash data			No	First year of crash data:			
	Project-level crash da	ata available	?	No	Last year of	f crash data	1:	
Ramp terminals	Segment crash data	available?		No	First year o	f crash data	a:	
	Project-level crash da	ata available	?	No	Last year of	f crash data	1:	
Estimated Crash Sta	atistics							
Crashes for Entire F	acility		Total	K	Α	В	С	PDO
	nes during Study Period, cra	shes:	4730.2	12.8	35.7	248.6	1025.4	3407.7
	req. during Study Period, cra		249.0	0.7	1.9	13.1	54.0	179.4
Crashes by Facility		Nbr. Sites	Total	K	A	В	C	PDO
Freeway segments, o		11	4658.2	12.0	33.4	236.2	1007.5	3369.0
Ramp segments, cras			4658.2 72.1					
,		8		0.8	2.3	12.3	17.9	38.7
Crossroad ramp term	0	0.0	0.0	0.0	0.0	0.0	0.0	
Crashes for Entire F	Year	Total	K	Α	В	С	PDO	
Estimated number of	•	2027	249.0	0.7	1.9	13.1	54.0	179.4
the Study Period, cra	shes:	2028	249.0	0.7	1.9	13.1	54.0	179.4
		2029	249.0	0.7	1.9	13.1	54.0	179.4
		2030	249.0	0.7	1.9	13.1	54.0	179.4
		2031	249.0	0.7	1.9	13.1	54.0	179.4
		2032	249.0	0.7	1.9	13.1	54.0	179.4
		2033	249.0	0.7	1.9	13.1	54.0	179.4
		2034	249.0	0.7	1.9	13.1	54.0	179.4
		2035	249.0	0.7	1.9	13.1	54.0	179.4
				_				_
		2036	249.0	0.7	1.9	13.1	54.0	179.4
		2037	249.0	0.7	1.9	13.1	54.0	179.4
		2038	249.0	0.7	1.9	13.1	54.0	179.4
		2039	249.0	0.7	1.9	13.1	54.0	179.4
		2040	249.0	0.7	1.9	13.1	54.0	179.4
		2041	249.0	0.7	1.9	13.1	54.0	179.4
		2042	249.0	0.7	1.9	13.1	54.0	179.4
		2043	249.0	0.7	1.9	13.1	54.0	
1		2044	249.0	0.7	4.0			179.4
				0.7	1.9	13.1	54.0	179.4 179.4
á .		2045	249.0	0.7	1.9			
				-		13.1	54.0	179.4
		2046		-			54.0	179.4
		2046 2047		-			54.0	179.4
		2046 2047 2048		-			54.0	179.4
		2046 2047 2048 2049		-			54.0	179.4
Distribution of Cros	has for Entire Facilit	2046 2047 2048 2049 2050		-			54.0	179.4
Distribution of Cras	hes for Entire Facility	2046 2047 2048 2049 2050	249.0	0.7	1.9	13.1	54.0 54.0	179.4 179.4
	hes for Entire Facilit	2046 2047 2048 2049 2050	249.0	0.7	1.9 er of Crash	13.1	54.0 54.0	179.4 179.4 Period
Crash Type	Crash Type Ca	2046 2047 2048 2049 2050	249.0 Estima Total	0.7	1.9 er of Crash	es During t	54.0 54.0 the Study	179.4 179.4 Period
	Crash Type Car Head-on crashes:	2046 2047 2048 2049 2050	Estima Total 14.1	0.7 ted Numb K	1.9 er of Crash A	es During t B 1.5	54.0 54.0 the Study C 6.4	179.4 179.4 Period PDO 6.0
Crash Type	Crash Type Car Head-on crashes: Right-angle crashes:	2046 2047 2048 2049 2050	249.0 Estima Total 14.1 82.3	0.7 ted Numb K 0.1 0.3	1.9 er of Crash A 0.2 0.8	13.1 es During 1 B 1.5 5.6	54.0 54.0 the Study C 6.4 24.0	179.4 179.4 Period PDO 6.0 51.6
Crash Type	Crash Type Cat Head-on crashes: Right-angle crashes: Rear-end crashes:	2046 2047 2048 2049 2050	Estima Total 14.1 82.3 2766.4	0.7 ted Numb K 0.1 0.3 7.3	1.9 er of Crash A	es During t B 1.5 5.6 142.2	54.0 54.0 the Study I C 6.4 24.0 598.1	179.4 179.4 Period PDO 6.0 51.6 1998.7
Crash Type	Crash Type Cat Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes:	2046 2047 2048 2049 2050 / egory	Estima Total 14.1 82.3 2766.4 947.2	0.7 ted Numb K 0.1 0.3	1.9 er of Crash A 0.2 0.8	13.1 es During 1 B 1.5 5.6	54.0 54.0 the Study C 6.4 24.0	179.4 179.4 Period PDO 6.0 51.6
Crash Type	Crash Type Cat Head-on crashes: Right-angle crashes: Rear-end crashes:	2046 2047 2048 2049 2050 / egory	Estima Total 14.1 82.3 2766.4	0.7 ted Numb K 0.1 0.3 7.3	1.9 er of Crash A 0.2 0.8 20.2	es During t B 1.5 5.6 142.2	54.0 54.0 the Study I C 6.4 24.0 598.1	179.4 179.4 Period PDO 6.0 51.6 1998.7
Crash Type	Crash Type Cat Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle	2046 2047 2048 2049 2050 // egory	Estima Total 14.1 82.3 2766.4 947.2 102.6	0.7 ted Numb K 0.1 0.3 7.3 1.7 0.3	1.9 er of Crash A 0.2 0.8 20.2 4.9 0.9	13.1 es During 1 B 1.5 5.6 142.2 34.3 6.2	54.0 54.0 54.0 the Study I C 6.4 24.0 598.1 144.6 25.0	179.4 179.4 179.4 Period PDO 6.0 51.6 1998.7 761.7 70.2
Crash Type Multiple vehicle	Crash Type Cat Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehicle	2046 2047 2048 2049 2050 // egory	Estima Total 14.1 82.3 2766.4 947.2 102.6 3912.8	0.7 ted Numb K 0.1 0.3 7.3 1.7 0.3 9.7	1.9 er of Crash A 0.2 0.8 20.2 4.9 0.9 27.0	es During t B 1.5 5.6 142.2 34.3 6.2 189.9	54.0 54.0 54.0 the Study C 6.4 24.0 598.1 144.6 25.0 798.0	179.4 179.4 Period PDO 6.0 51.6 1998.7 761.7 70.2 2888.2
Crash Type	Crash Type Cat Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehicle Crashes with animal:	2046 2047 2048 2049 2050 / eegory	Estima Total 14.1 82.3 2766.4 947.2 102.6 3912.8 12.2	0.7 ted Numb K 0.1 0.3 7.3 1.7 0.3 9.7 0.0	1.9 er of Crash A 0.2 0.8 20.2 4.9 0.9 27.0 0.0	13.1 es During 1 B 1.5 5.6 142.2 34.3 6.2 189.9 0.2	54.0 54.0 54.0 the Study I C 6.4 24.0 598.1 144.6 25.0 798.0 0.8	179.4 179.4 179.4 Period PDO 6.0 51.6 1998.7 761.7 70.2 2888.2 11.2
Crash Type Multiple vehicle	Crash Type Cat Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehic Crashes with animal: Crashes with fixed ob	2046 2047 2048 2049 2050 degory e crashes: ele crashes:	Estima Total 14.1 82.3 2766.4 947.2 102.6 3912.8 12.2 592.1	0.7 ted Numbe K 0.1 0.3 7.3 1.7 0.3 9.7 0.0 2.2	1.9 er of Crash A 0.2 0.8 20.2 4.9 0.9 27.0 0.0 6.3	13.1 es During 1 B 1.5 5.6 142.2 34.3 6.2 189.9 0.2 42.4	54.0 54.0 54.0 the Study I C 6.4 24.0 598.1 144.6 25.0 798.0 0.8 164.3	179.4 179.4 179.4 Period PDO 6.0 51.6 1998.7 761.7 70.2 2888.2 11.2 376.9
Crash Type Multiple vehicle	Crash Type Cat Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehicle Crashes with animal: Crashes with fixed of Crashes with other of	2046 2047 2048 2049 2050 degory e crashes: ele crashes: oject: oject:	Estima Total 14.1 82.3 2766.4 947.2 102.6 3912.8 12.2 592.1 83.6	0.7 ted Numbe K 0.1 0.3 7.3 1.7 0.3 9.7 0.0 2.2 0.1	1.9 er of Crash A 0.2 0.8 20.2 4.9 0.9 27.0 0.0 6.3 0.4	13.1 es During 1 B 1.5 5.6 142.2 34.3 6.2 189.9 0.2 42.4 2.7	54.0 54.0 54.0 the Study I C 6.4 24.0 598.1 144.6 25.0 798.0 0.8 164.3 11.4	179.4 179.4 179.4 Period PDO 6.0 51.6 1998.7 761.7 70.2 2888.2 11.2 376.9 68.9
Crash Type Multiple vehicle	Crash Type Cat Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehicle Crashes with animal: Crashes with fixed of Crashes with other of Crashes with parked	2046 2047 2048 2049 2050 degory e crashes: ele crashes: oject: oject: vehicle:	Estima Total 14.1 82.3 2766.4 947.2 102.6 3912.8 12.2 592.1 83.6 11.7	0.7 ted Numb K 0.1 0.3 7.3 1.7 0.3 9.7 0.0 2.2 0.1 0.0	1.9 er of Crash A 0.2 0.8 20.2 4.9 0.9 27.0 0.0 6.3 0.4 0.1	13.1 es During 1 B 1.5 5.6 142.2 34.3 6.2 189.9 0.2 42.4 2.7 0.8	54.0 54.0 54.0 the Study I C 6.4 24.0 598.1 144.6 25.0 798.0 0.8 164.3 11.4 3.2	179.4 179.4 179.4 179.4 PPO 6.0 51.6 1998.7 761.7 70.2 2888.2 11.2 376.9 68.9 7.6
Crash Type Multiple vehicle	Crash Type Cat Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehicle Crashes with animal: Crashes with fixed ob Crashes with other of Crashes with parked Other single-vehicle	2046 2047 2048 2049 2050 degory e crashes: ele crashes: oject: oject: vehicle: crashes	Estima Total 14.1 82.3 2766.4 947.2 102.6 3912.8 12.2 592.1 83.6 11.7 117.8	0.7 ted Numb K 0.1 0.3 7.3 1.7 0.3 9.7 0.0 2.2 0.1 0.0 0.7	1.9 er of Crash A 0.2 0.8 20.2 4.9 0.9 27.0 0.0 6.3 0.4 0.1 1.9	13.1 es During 1 B 1.5 5.6 142.2 34.3 6.2 189.9 0.2 42.4 2.7 0.8 12.5	54.0 54.0 54.0 54.0 C 6.4 24.0 598.1 144.6 25.0 798.0 0.8 164.3 11.4 3.2 47.7	179.4 179.4 179.4 179.4 PPO 6.0 51.6 1998.7 761.7 70.2 2888.2 11.2 376.9 68.9 7.6 55.0
Crash Type Multiple vehicle	Crash Type Cat Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehicle Crashes with animal: Crashes with fixed of Crashes with other of Crashes with parked	2046 2047 2048 2049 2050 degory e crashes: ele crashes: oject: oject: vehicle: crashes crashes:	Estima Total 14.1 82.3 2766.4 947.2 102.6 3912.8 12.2 592.1 83.6 11.7	0.7 ted Numb K 0.1 0.3 7.3 1.7 0.3 9.7 0.0 2.2 0.1 0.0	1.9 er of Crash A 0.2 0.8 20.2 4.9 0.9 27.0 0.0 6.3 0.4 0.1	13.1 es During 1 B 1.5 5.6 142.2 34.3 6.2 189.9 0.2 42.4 2.7 0.8	54.0 54.0 54.0 the Study I C 6.4 24.0 598.1 144.6 25.0 798.0 0.8 164.3 11.4 3.2	179.4 179.4 179.4 179.4 PPO 6.0 51.6 1998.7 761.7 70.2 2888.2 11.2 376.9 68.9 7.6

Evaluation Site Summary									
General In	formation					y			
Project des			Managed	anes Stud	V 2045 No	Build L40	95 Retween	MD 190 and I-270Y	
	scription.	PK			1/31/2022	Dulid_ 1-4			
Analyst:	of analysis:	2027	լլ Total length			o for Ctude	Area type:	Urban 1.290	
	of analysis:	2045	i otal leligili	Ollieewa	ly segment	s ioi Study	renou (IIII)	1.290	
		2045							
Site Desci	•								
Freeway S									
Number	Lanes		Study Perio	d Descript	tion				
		Length (mi)							
1	10	0.200	GP MP 2.37 - I	MP 2.57					
2	10	0.030	GP MP 2.57 - I	MP 2.60					
3	10	0.650	GP MP 2.60 -	MP 3.25					
4	10	0.410	GP MP 3.25 - I	MP 3.66					
5	0	0.000	0						
6	0	0.000	0						
7	0	0.000	0						
8	0	0.000	0						
9	0	0.000	0						
10	0	0.000	0						
11	0	0.000	0						
12	0	0.000	0						
13	0	0.000	0						
14	0	0.000	0						
15	0	0.000	0						
16	0	0.000	0						
17	0	0.000	0						
18	0	0.000	0						
19	0	0.000	0						
20	0	0.000	0						
Ramp Seg									
Number	Study Peri	od			Number	Study Peri	iod		
	Description	า				Description	n		
1	GA-1 Ramp f	rom CBP to I-	ł		21	0			
2	GB-1 Ramp f					o			
3		rom CBP to M	İ		22	0			
	G1-1 Ramp f					_			
4	G1-1 Ramp fi G4-1 Ramp fi	rom I-495 NB			22	0			
	-	rom I-495 NB rom I-495 NB			22 23	0			
5	G4-1 Ramp f	rom I-495 NB rom I-495 NB rom I-495 NB			22 23 24 25	0 0 0			
5 6	G4-1 Ramp fi G4-2 Ramp fi	rom I-495 NB rom I-495 NB rom I-495 NB rom I-495 NB			22 23 24	0 0 0 0			
5 6 7	G4-1 Ramp fi G4-2 Ramp fi G4-3 Ramp fi G2-1 Ramp fi	rom I-495 NB rom I-495 NB rom I-495 NB rom I-495 NB rom MD 190 V			22 23 24 25 26 27	0 0 0 0			
5 6 7 8	G4-1 Ramp fi G4-2 Ramp fi G4-3 Ramp fi	rom I-495 NB rom I-495 NB rom I-495 NB rom I-495 NB rom MD 190 V			22 23 24 25 26 27 28	0 0 0 0 0			
5 6 7 8 9	G4-1 Ramp fi G4-2 Ramp fi G4-3 Ramp fi G2-1 Ramp fi G5-1 Ramp fi 0	rom I-495 NB rom I-495 NB rom I-495 NB rom I-495 NB rom MD 190 V rom Ramp 11			22 23 24 25 26 27 28 29	0 0 0 0 0 0			
5 6 7 8 9 10	G4-1 Ramp fi G4-2 Ramp fi G4-3 Ramp fi G2-1 Ramp fi G5-1 Ramp fi 0 G7-1 Ramp 7	rom I-495 NB rom I-495 NB rom I-495 NB rom I-495 NB rom MD 190 V rom Ramp 11			22 23 24 25 26 27 28 29 30	0 0 0 0 0 0 0 0			
5 6 7 8 9 10 11	G4-1 Ramp fi G4-2 Ramp fi G4-3 Ramp fi G2-1 Ramp fi G5-1 Ramp fi 0 G7-1 Ramp 7 G10-1 Ramp	rom I-495 NB rom I-495 NB rom I-495 NB rom I-495 NB rom MD 190 V rom Ramp 11 ' to Ramp 11 from I-495 SE			22 23 24 25 26 27 28 29 30 31	0 0 0 0 0 0 0 0 0			
5 6 7 8 9 10 11 12	G4-1 Ramp fi G4-2 Ramp fi G4-3 Ramp fi G2-1 Ramp fi 0 G7-1 Ramp 7 G10-1 Ramp SB CD-5 fron	rom I-495 NB rom I-495 NB rom I-495 NB rom I-495 NB rom MD 190 V rom Ramp 11 r to Ramp 11 from I-495 SE n MD 190 to I-			22 23 24 25 26 27 28 29 30 31 32	0 0 0 0 0 0 0 0 0 0			
5 6 7 8 9 10 11 12 13	G4-1 Ramp fi G4-2 Ramp fi G4-3 Ramp fi G2-1 Ramp fi 0 G7-1 Ramp 7 G10-1 Ramp SB CD-5 fron SB CD-6 fron	rom I-495 NB rom I-495 NB rom I-495 NB rom I-495 NB rom MD 190 V rom Ramp 11 from I-495 SE n MD 190 to I- n MD 190 to I-			22 23 24 25 26 27 28 29 30 31 32 33	0 0 0 0 0 0 0 0 0 0			
5 6 7 8 9 10 11 12 13	G4-1 Ramp fi G4-2 Ramp fi G4-3 Ramp fi G2-1 Ramp fi 0 G7-1 Ramp 7 G10-1 Ramp SB CD-5 fron SB CD-6 fron SB CD-1 fron	rom I-495 NB rom I-495 NB rom I-495 NB rom I-495 NB rom MD 190 V rom Ramp 11 from I-495 SB n MD 190 to I- n MD 190 to I- n I-495 SB to 6			22 23 24 25 26 27 28 29 30 31 32 33 34	0 0 0 0 0 0 0 0 0 0 0			
5 6 7 8 9 10 11 12 13 14	G4-1 Ramp fi G4-2 Ramp fi G4-3 Ramp fi G2-1 Ramp fi 0 G7-1 Ramp 7 G10-1 Ramp SB CD-5 fron SB CD-6 fron SB CD-1 fron SB CD-2 fron	rom I-495 NB rom I-495 NB rom I-495 NB rom I-495 NB rom MD 190 V rom Ramp 11 from I-495 SB n MD 190 to I- n MD 190 to I- n I-495 SB to 6 n I-495 SB ME			22 23 24 25 26 27 28 29 30 31 32 33 34 35	0 0 0 0 0 0 0 0 0 0 0 0			
5 6 7 8 9 10 11 12 13 14 15 16	G4-1 Ramp fi G4-2 Ramp fi G4-3 Ramp fi G5-1 Ramp fi 0 G7-1 Ramp 7 G10-1 Ramp SB CD-5 fron SB CD-6 fron SB CD-1 fron SB CD-2 fron SB CD-2 fron SB CD-3 Rar	rom I-495 NB rom I-495 NB rom I-495 NB rom I-495 NB rom MD 190 V rom Ramp 11 from I-495 SB n MD 190 to I- n MD 190 to I- n I-495 SB ME np from I-495 SB Mp			22 23 24 25 26 27 28 29 30 31 32 33 34 35 36	0 0 0 0 0 0 0 0 0 0 0 0			
5 6 7 8 9 10 11 12 13 14 15 16	G4-1 Ramp fi G4-2 Ramp fi G4-3 Ramp fi G5-1 Ramp fi 0 G7-1 Ramp 7 G10-1 Ramp SB CD-5 fron SB CD-6 fron SB CD-2 fron SB CD-2 fron SB CD-3 Rar SB CD-4 fron	rom I-495 NB rom I-495 NB rom I-495 NB rom I-495 NB rom MD 190 V rom Ramp 11 from I-495 SB n MD 190 to I- n MD 190 to I- n I-495 SB ME np from I-495 SB ME np from I-495 SB ME			22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37	0 0 0 0 0 0 0 0 0 0 0 0 0			
5 6 7 8 9 10 11 12 13 14 15 16 17	G4-1 Ramp fi G4-2 Ramp fi G2-1 Ramp fi G5-1 Ramp fi 0 G7-1 Ramp 7 G10-1 Ramp SB CD-5 fron SB CD-6 fron SB CD-2 fron SB CD-2 fron SB CD-3 Rar SB CD-4 fron G2-2 Ramp fi	rom I-495 NB rom I-495 NB rom I-495 NB rom I-495 NB rom MD 190 V rom Ramp 11 from I-495 SB n MD 190 to I- n MD 190 to I- n I-495 SB ME rom I-495 SB ME rom I-495 SB ME rom MD 190 V			22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38	0 0 0 0 0 0 0 0 0 0 0 0 0 0			
5 6 7 8 9 10 11 12 13 14 15 16 17 18	G4-1 Ramp fi G4-2 Ramp fi G4-3 Ramp fi G2-1 Ramp fi 0 G7-1 Ramp 7 G10-1 Ramp SB CD-5 fron SB CD-6 fron SB CD-2 fron SB CD-3 Rar SB CD-4 fron G2-2 Ramp fi G6-1 Ramp fi	rom I-495 NB rom I-495 NB rom I-495 NB rom I-495 NB rom MD 190 V rom Ramp 11 from I-495 SB n MD 190 to I- n MD 190 to I- n I-495 SB ME np from I-495 SB ME np from I-495 SB ME			22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39	0 0 0 0 0 0 0 0 0 0 0 0			
5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	G4-1 Ramp fi G4-2 Ramp fi G4-3 Ramp fi G2-1 Ramp fi 0 G7-1 Ramp 7 G10-1 Ramp SB CD-5 fron SB CD-6 fron SB CD-2 fron SB CD-3 Rar SB CD-4 fron G2-2 Ramp fi G6-1 Ramp fi	rom I-495 NB rom I-495 NB rom I-495 NB rom I-495 NB rom MD 190 V rom Ramp 11 from I-495 SB n MD 190 to I- n MD 190 to I- n I-495 SB ME rom I-495 SB ME rom I-495 SB ME rom MD 190 V rom MD 190 V rom MD 190 V rom MD 190 V			22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38	0 0 0 0 0 0 0 0 0 0 0 0 0 0			
5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	G4-1 Ramp fi G4-2 Ramp fi G4-3 Ramp fi G2-1 Ramp fi 0 G7-1 Ramp 7 G10-1 Ramp SB CD-5 fron SB CD-6 fron SB CD-2 fron SB CD-3 Rar SB CD-4 fron G2-2 Ramp fi G6-1 Ramp fi 0	rom I-495 NB rom I-495 NB rom I-495 NB rom I-495 NB rom MD 190 V rom Ramp 11 from I-495 SB n MD 190 to I- n MD 190 to I- n I-495 SB MD np from I-495 SB MD rom MD 190 V rom MD 190 V rom MD 190 V rom MD 190 E			22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40	0 0 0 0 0 0 0 0 0 0 0 0			
5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	G4-1 Ramp fi G4-2 Ramp fi G4-3 Ramp fi G2-1 Ramp fi 0 G7-1 Ramp 7 G10-1 Ramp SB CD-5 fron SB CD-6 fron SB CD-2 fron SB CD-3 Rar SB CD-4 fron G2-2 Ramp fi G6-1 Ramp fi	rom I-495 NB rom I-495 NB rom I-495 NB rom I-495 NB rom MD 190 V rom Ramp 11 from I-495 SB n MD 190 to I- n MD 190 to I- n I-495 SB ME rom I-495 SB ME rom I-495 SB ME rom MD 190 V rom MD 190 V rom MD 190 V rom MD 190 V		d Descript	22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40	0 0 0 0 0 0 0 0 0 0 0 0			
5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 Crossroad Number	G4-1 Ramp fi G4-2 Ramp fi G4-3 Ramp fi G2-1 Ramp fi 0 G7-1 Ramp 7 G10-1 Ramp SB CD-5 fron SB CD-6 fron SB CD-2 fron SB CD-3 Ram SB CD-4 fron G2-2 Ramp fi G6-1 Ramp fi 0 D Ramp Te Config.	rom I-495 NB rom I-495 NB rom I-495 NB rom I-495 NB rom MD 190 V rom Ramp 11 from I-495 SB n MD 190 to I- n MD 190 to I- n MD 190 to I- n I-495 SB MC np from I-495 SB MC rom MD 190 V rom MD 190 V rom MD 190 E rom MD 190 E	Study Perio		22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40	0 0 0 0 0 0 0 0 0 0 0 0			
5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 Crossroad Number	G4-1 Ramp fi G4-2 Ramp fi G4-3 Ramp fi G2-1 Ramp fi 0 G7-1 Ramp 7 G10-1 Ramp SB CD-5 fron SB CD-6 fron SB CD-2 fron SB CD-3 Ram SB CD-4 fron G2-2 Ramp fi G6-1 Ramp fi 0 D Ramp Te Config.	rom I-495 NB rom I-495 NB rom I-495 NB rom I-495 NB rom MD 190 V rom Ramp 11 from I-495 SB n MD 190 to I- n MD 190 to I- n MD 190 to I- n I-495 SB MC np from I-495 SB MC rom MD 190 V rom MD 190 V rom MD 190 E rminals Control	Study Perio	95 NB	22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40	0 0 0 0 0 0 0 0 0 0 0 0			
5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 Crossroad Number	G4-1 Ramp fi G4-2 Ramp fi G4-3 Ramp fi G2-1 Ramp fi 0 G7-1 Ramp 7 G10-1 Ramp SB CD-5 fron SB CD-6 fron SB CD-2 fron SB CD-3 Ram SB CD-4 fron G2-2 Ramp fi G6-1 Ramp fi 0 TRamp Te Config. D3en D3ex	rom I-495 NB rom I-495 NB rom I-495 NB rom I-495 NB rom MD 190 V rom Ramp 11 from I-495 SB n MD 190 to I- n MD 190 to I- n I-495 SB MD rom MD 190 to I- n I-495 SB ME rom MD 190 V rom MD 190 V rom MD 190 E rminals Control Signal	Study Perio MD 190 at I-49 MD 190 at I-49	95 NB	22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40	0 0 0 0 0 0 0 0 0 0 0 0			
5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 Crossroad Number	G4-1 Ramp fi G4-2 Ramp fi G4-3 Ramp fi G2-1 Ramp fi 0 G7-1 Ramp 7 G10-1 Ramp SB CD-5 fron SB CD-6 fron SB CD-2 fron SB CD-3 Ramp SB CD-4 fron G2-2 Ramp fi G6-1 Ramp fi 0 D Ramp Te Config. D 3en D 3ex 0	rom I-495 NB rom I-495 NB rom I-495 NB rom I-495 NB rom MD 190 V rom Ramp 11 from I-495 SB n MD 190 to I- n MD 190 to I- n MD 190 to I- n I-495 SB MC rom MD 190 To I- n I-495 SB MC rom MD 190 V rom MD 190 V rom MD 190 E rminals Control Signal Signal 0	Study Perio MD 190 at I-49 MD 190 at I-49 0	95 NB	22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40	0 0 0 0 0 0 0 0 0 0 0 0			
5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 Crossroad Number	G4-1 Ramp fi G4-2 Ramp fi G4-3 Ramp fi G2-1 Ramp fi 0 G7-1 Ramp 7 G10-1 Ramp SB CD-5 fron SB CD-6 fron SB CD-2 fron SB CD-3 Ramp fi G6-1 Ramp fi 0 D7 Ramp fi D7 Ramp fi D8 COnfig. D9 D9 D9 D9 D9 D9 D9 D9 D9 D9 D9 D9 D9 D	rom I-495 NB rom I-495 NB rom I-495 NB rom I-495 NB rom MD 190 V rom Ramp 11 from I-495 SB n MD 190 to I- n MD 190 to I- n MD 190 to I- n I-495 SB ME rom MD 190 To I- n I-495 SB ME rom MD 190 V rom MD 190 E rom MD 190 E rminals Control Signal O 0	Study Perio MD 190 at I-49 MD 190 at I-49	95 NB	22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40	0 0 0 0 0 0 0 0 0 0 0 0			
5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 Crossroad Number	G4-1 Ramp fi G4-2 Ramp fi G4-3 Ramp fi G2-1 Ramp fi 0 G7-1 Ramp 7 G10-1 Ramp SB CD-5 fron SB CD-6 fron SB CD-2 fron SB CD-3 Ramp SB CD-4 fron G2-2 Ramp fi G6-1 Ramp fi 0 D Ramp Te Config. D 3en D 3ex 0	rom I-495 NB rom I-495 NB rom I-495 NB rom I-495 NB rom MD 190 V rom Ramp 11 from I-495 SB n MD 190 to I- n MD 190 to I- n MD 190 to I- n I-495 SB MC rom MD 190 To I- n I-495 SB MC rom MD 190 V rom MD 190 V rom MD 190 E rminals Control Signal Signal 0	Study Perio MD 190 at I-49 MD 190 at I-49 0	95 NB	22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40	0 0 0 0 0 0 0 0 0 0 0 0			

		Out	put Summ	ary				
General Information	1			· ,				
Project description:	I-270 I-495 Managed	Lanes Stud	v 2045 No	Build I-49	95 Between	MD 190 an	d I-270Y	
Analyst:	PK		1/31/2022		Area type:		Urban	
First year of analysis	: 2027				71			
Last year of analysis								
Crash Data Descrip								
Freeway segments	Segment crash data a	available?		No	First year of crash data:			
	Project-level crash da		?	No	Last year of crash data:			
Ramp segments	Segment crash data a			No	First year of crash data:			
r tamp oogoto	Project-level crash da		?	No	,	of crash data		
Ramp terminals	Segment crash data a		-	No		of crash data		
. tamp tommalo	Project-level crash da		?	No		of crash data		
Estimated Crash St					,			
Crashes for Entire I			Total	K	Α	В	С	PDO
	nes during Study Period, cras	shes:	2554.3	7.5	22.7	151.4	575.8	1796.9
	req. during Study Period, cra		134.4	0.4	1.2	8.0	30.3	94.6
Crashes by Facility		Nbr. Sites	Total	K	Α	В	C	PDO
Freeway segments, of	-	4	2244.4	5.9	16.4	116.8	493.0	1612.3
Ramp segments, cra		18	179.0	1.6	4.7	25.4	41.3	106.0
Crossroad ramp term		2	130.9	0.1	1.5	9.2	41.5	78.6
Crashes for Entire I		Year	Total	K	A	В	C C	PDO
Estimated number of	2027	134.4	0.4	1.2	8.0	30.3	94.6	
the Study Period, cra	•	2027	134.4	0.4	1.2	8.0	30.3	94.6
ino olady i oliou, ola	ioi ioo.	2029	134.4	0.4	1.2	8.0	30.3	94.6
		2029	134.4	0.4	1.2	8.0	30.3	94.6
		2030	134.4	0.4	1.2	8.0	30.3	94.6
		2032	134.4	0.4	1.2	8.0	30.3	94.6
		2033	134.4	0.4	1.2	8.0	30.3	94.6
		2034	134.4	0.4	1.2	8.0	30.3	94.6
		2035	134.4	0.4	1.2	8.0	30.3	94.6
		2036	134.4	0.4	1.2	8.0	30.3	94.6
		2037	134.4	0.4	1.2	8.0	30.3	94.6
		2038	134.4	0.4	1.2	8.0	30.3	94.6
		2039	134.4	0.4	1.2	8.0	30.3	94.6
		2040	134.4	0.4	1.2	8.0	30.3	94.6
		2040	134.4	0.4	1.2	8.0	30.3	94.6
		2041	134.4	0.4	1.2	8.0	30.3	94.6
		2042	134.4	0.4	1.2	8.0	30.3	94.6
		2043	134.4	0.4	1.2	8.0	30.3	94.6
		2044	134.4	0.4	1.2	8.0	30.3	94.6
		2045	134.4	0.4	1.2	0.0	50.5	34.0
		2040						
		2047						
		2048						
		2049						
Distribution of Cras	hes for Entire Facility							
			Estima	ted Numb	er of Crash	es During	the Study I	Period
Crash Type	Crash Type Cat	egory	Total	K	A	B	C	PDO
Multiple vehicle	Head-on crashes:		8.3	0.0	0.1	0.9	3.6	3.7
	Right-angle crashes:		69.4	0.2	0.8	5.1	21.9	41.5
	Rear-end crashes:		1403.3	3.7	11.3	78.1	316.4	993.8
	Sideswipe crashes:		473.7	0.9	2.5	17.7	71.9	380.7
	Other multiple-vehicle	crashes:	56.4	0.2	0.6	3.9	13.6	38.2
	Total multiple-vehic		2011.1	5.0	15.3	105.6	427.3	1457.9
Single vehicle	Crashes with animal:	10 01401100.	7.0	0.0	0.0	0.1	0.5	6.3
gio 70111010	Crashes with fixed ob	iect:	397.6	1.8	5.3	32.9	106.6	250.9
	Crashes with other of		50.0	0.1	0.3	1.8	6.9	40.9
	Crashes with parked		7.5	0.0	0.3	0.6	2.0	40.8
	Other single-vehicle		81.2	0.6	1.7	10.4	32.5	36.1
	Total single-vehicle		543.2	2.5	7.4	45.8	148.5	339.0
	Total crasl		2554.3	7.5		151.4	575.8	1796.9
	i otai olasi	100.	2004.0	1.5	۷۷.۱	101.4	010.0	1790.8

			Evalua	tion Site S	ummary			
Conoral In	formation		Evalua	lion Site S	ullillary			
Project des			Managed Lanes Stud	1v 2045 No	Duild L 40	E Potwoon	1 270V to MD 197	
	scription.							
Analyst:		PK	Date:	1/31/2022		Area type:	Urban	
	of analysis:	2027	Total length of freewa	ay segment	s for Study	Period (mi)	1.950	
	of analysis:	2045						
Site Desci								
Freeway S	Segments							
Number	Lanes	Study Period	Study Period Descrip	tion				
		Length (mi)						
1	6	0.050	GP MP 3.66 - MP 3.71					
2	6	1.220	GP MP 3.71 - MP 4.93					
3	6	0.470	GP MP 4.93 - MP 5.40					
4	6	0.060	GP MP 5.40 - MP 5.46					
5	6	0.150	GP MP 5.46 - MP 5.61					
		0.000						
6	0		0					
7	0	0.000	0					
8	0	0.000	0					
9	0	0.000	0					
10	0	0.000	0					
11	0	0.000	0					
12	0	0.000	0					
13	0	0.000	0					
14	0	0.000	0					
15	0	0.000	0					
16	0	0.000	0					
17	0	0.000	0					
18	0	0.000	0					
19	0	0.000	0					
20	0	0.000	0					
Ramp Seg	iments		<u> </u>			l.		
	Study Peri	od		Number	Study Per	ind		
	Description				Descriptio			
1	G2-1 Ramp fi			21	0			
	0	101111 100 110		22	0			
	0			23	0			
	G4-2 Ramp fi	rom MD 187 N		24	0			
	G6-1 Ramp fi			25	0			
6	0 - 1 Kamp II	10111 1-433 LB		26	0			
7				27				
8	0 Ge 2 Ramp fr	rom MD 407 +		28	0			
	G8-2 Ramp fi	אן לאו לוויטוויטו	1					
9	0			29	0			
10	0			30	0			
	0			31	0			
12	0			32	0			
	0			33	0			
14	0			34	0			
15	0			35	0			
16	0			36	0			
17	0			37	0			
18	0			38	0			
19	0			39	0			
20	0			40	0			
Crossroad	Ramp Te	rminals						
Number	Config.	Control	Study Period Descrip	tion				
1	0	0	0					
2								
	0	0	0					
3	0	0	0					
4	0	0	0					
5	0	0	0					
6	0	0	0					

		Out	put Summ	arv				
General Information	n			· ,				
Project description:	I-270 I-495 Managed	Lanes Stud	v 2045 No	Build I-49	5 Between	I-270Y to N	1D 187	
Analyst:	PK		1/31/2022	_	Area type:		Urban	
First year of analysis			.,			I		
Last year of analysis								
Crash Data Descrip								
Freeway segments	Segment crash data	available?		No	First year o	of crash data	a·	
r reeway segments	Project-level crash da		.2	No	Last year of crash data:			
Ramp segments	Segment crash data			No	First year of crash data:			
ramp segments	Project-level crash da		.2	No	Last year of crash data:			
Damen tamainala			; f	No	First year of crash data:			
Ramp terminals	Segment crash data a Project-level crash data		.2	No		of crash data		
Estimated Crash St		ala avallable	; f	NO	Last year C	n Crasii uala	a	
		1	Tatal	1/	•	- D	_	
Crashes for Entire			Total	K	Α	В	C	PDO
	hes during Study Period, cra		1248.1	4.5	12.2	84.5	282.5	864.4
•	freq. during Study Period, cra		65.7	0.2	0.6	4.4	14.9	45.5
Crashes by Facility	-	Nbr. Sites	Total	K	Α	В	С	PDO
Freeway segments,	5	1223.6	4.2	11.3	80.1	276.4	851.5	
Ramp segments, cra		4	24.5	0.3	0.9	4.4	6.1	12.9
Crossroad ramp tern	ninals, crashes:	0	0.0	0.0	0.0	0.0	0.0	0.0
Crashes for Entire	Year	Total	K	Α	В	С	PDO	
Estimated number of crashes during		2027	65.7	0.2	0.6	4.4	14.9	45.5
	the Study Period, crashes:			0.2	0.6	4.4	14.9	45.5
,	=-	2028 2029	65.7 65.7	0.2	0.6	4.4	14.9	45.5
		2030	65.7	0.2	0.6	4.4	14.9	45.5
		2031	65.7	0.2	0.6	4.4	14.9	45.5
		2032	65.7	0.2	0.6	4.4	14.9	45.5
		2032	65.7	0.2	0.6	4.4	14.9	45.5
		2033	65.7	0.2	0.6	4.4	14.9	45.5
		2035	65.7	0.2	0.6	4.4	14.9	45.5
				-				
		2036	65.7	0.2	0.6	4.4	14.9	45.5
		2037	65.7	0.2	0.6	4.4	14.9	45.5
		2038	65.7	0.2	0.6	4.4	14.9	45.5
		2039	65.7	0.2	0.6	4.4	14.9	45.5
		2040	65.7	0.2	0.6	4.4	14.9	45.5
		2041	65.7	0.2	0.6	4.4	14.9	45.5
		2042	65.7	0.2	0.6	4.4	14.9	45.5
		2043	65.7	0.2	0.6	4.4	14.9	45.5
		2044	65.7	0.2	0.6	4.4	14.9	45.5
		2045	65.7	0.2	0.6	4.4	14.9	45.5
1		2046						
		2047						
		2048						
		2049						
		2050						
Distribution of Cras	shes for Entire Facility		Ŀ			1	Į.	
			Estima	ted Numb	er of Crash	es During	the Study	Period
Crash Type	Crash Type Cat	tegory	Total	K	A	В	C	PDO
Multiple vehicle	Head-on crashes:		3.4	0.0	0.1	0.5	1.6	1.3
	Right-angle crashes:		19.6	0.1	0.2	1.7	6.0	11.5
	Rear-end crashes:		642.8	2.3	6.1	43.2	148.3	442.9
	Sideswipe crashes:		218.6	0.5	1.5	10.4	35.8	170.3
	Other multiple-vehicle	craches:	23.7	0.3	0.3	1.8	6.1	170.3
Cinalo vehiele	Total multiple-vehic		908.0	3.0	8.2	57.7	197.7	641.4
Single vehicle	Crashes with animal:		5.1	0.0	0.0	0.1	0.3	4.7
		JIECI.	245.6	1.0	2.9	19.3	61.1	161.3
3	Crashes with fixed ob	Crashes with other object:						
Ü	Crashes with other ol	bject:	35.6	0.1	0.2	1.3	4.2	29.9
J	Crashes with other ol Crashes with parked	bject: vehicle:	35.6 5.1	0.1 0.0	0.1	0.4	1.2	3.4
ů	Crashes with other of Crashes with parked Other single-vehicle	bject: vehicle: crashes	35.6 5.1 48.7	0.1		0.4 5.8	1.2 17.9	3.4 23.8
	Crashes with other ol Crashes with parked	bject: vehicle: crashes crashes:	35.6 5.1	0.1 0.0	0.1 0.9 4.0	0.4	1.2	3.4

			Evalua	tion Site S	ummary			
General In	formation		⊏valua	lion Site S	ullillary			
Project des			Managed Lane Study	/ 2045 No	Ruild I 405	MD 197 +~	1-270 M/D 3	255
	scription.	PK		1/31/2022				
Analyst:	-fli		Date:			Area type:		Urban
	of analysis:	2027	Total length of freewa	iy segment	s for Study	Period (mi)	1.460	
	of analysis:	2045						
Site Desci								
Freeway S								
Number	Lanes	Study Period	Study Period Descrip	tion				
		Length (mi)						
1	6	0.140	GP MP 5.61 - MP 5.75					
2	6	0.070	GP MP 5.75 - MP 5.82					
3	6	0.470	GP MP 5.82 - MP 6.29					
4	5	0.180	GP MP 6.29 - MP 6.47					
5	5	0.030	GP MP 6.47 - MP 6.50					
6	8	0.180	GP MP 6.50 - MP 6.68					
7	8	0.080	GP MP 6.68 - MP 6.76					
8	9	0.030	GP MP 6.76 - MP 6.79]		
9	9	0.070	GP MP 6.79 - MP 6.86]		
10	9	0.070	GP MP 6.79 - MP 6.86 GP MP 6.86 - MP 7.07					
11	0	0.000	0					
12	0	0.000	0]		
13	0	0.000	0					
14	0	0.000	0					
15	0	0.000	0					
16	0	0.000	0					
17	0	0.000	0					
18	0	0.000	0					
19	0	0.000	0					
20	0	0.000	0					
Ramp Seg	ments	ı	L			ų.		
	Study Peri	od		Number	Study Peri	od		
	Description				Description			
1		m MD 355 NB		21	0			
2	•	m MD 355 NB		22	0			
3	-	m I-495 WB to		23	0			
4	-	m MD 355 NB		24	0			
5	•	m MD 355 SB		25	0			
6	G6-1 Ramp fi			26	0			
7	-							
	G6-2 Ramp from			27 28	0			
8	G6 Ramp from				0			
9		-270 NB Conr		29	0			
10		-270 NB Conr		30	0			
11	I-270 SB to I-	495 EB Conn		31	0			
12	0			32	0			
	0			33	0			
14	0			34	0			
15	0			35	0			
16	0			36	0			
17	0			37	0			
18	0			38	0			
19	0			39	0			
20	0			40	0			
	d Ramp Te	rminals	ı	· · · · · ·				
Number	Config.	Control	Study Period Descrip	tion				
4	D4	Cianal	MD 407 -41 405 MD			1		
1	D4	Signal	MD 187 at I-495 WB					
2	D4	Signal	MD 187 at I-495 EB					
3	0	0	0]		
4	0	0	0					
5	0	0	0]		
6	0	0	0					

Project description: L270 495 Managed Lane Study 2045 No Build 495 MD 187 to -270 MD 355					arv	put Summ	Out		
Project description: Profession Project					41 y	put Guillille	Jul		General Information
Analyst:		55	-270 MD 35	MD 187 to	uild I_405	2045 No F	Lane Study		
First year of analysis 2027						_			
Last year of analysis: 2045 Segment crash data available? No First year of crash data: Project-level crash data available? No Last year of crash data: Project-level crash data available? No First year of crash data: Project-level crash data available? No First year of crash data: Project-level crash data available? No First year of crash data: Project-level crash data available? No First year of crash data: Project-level crash data available? No First year of crash data: Project-level crash data available? No First year of crash data: Project-level crash data available? No First year of crash data: Project-level crash data available? No First year of crash data: Project-level crash data available? No First year of crash data: Project-level crash data available? No First year of crash data: Project-level crash data available? No First year of crash data: Project-level crash data available? No First year of crash data: Project-level crash data available? No First year of crash data: Project-level crash data available? No First year of crash data: Project-level crash data available? No First year of crash data: Project-level crash data available? No First year of crash data: Project-level crash data available? No First year of crash data: Project-level crash data available? No First year of crash data: Project-level crash data available? No First year of crash data: Project-level crash data available? No First year of crash data: Project-level crash data available? No First year of crash data: Project-level crash data available? No First year of crash data: Project-level crash data available? No First year of crash data: Project-level crash data available? No First year of crash data: Project-level crash available? No First year of crash data: Project-level crash available? Project-level crash available? No First year of crash data: Project-		JIDAH	Į.	Alea type:		1/31/2022	Date.		
Project-level crash data available?									
Segment crash data available? No First year of crash data: Project-level crash data available? No Last year of crash data: Segment crash data available? No Last year of crash data: Project-level crash data available? No Last year of crash data: Project-level crash data available? No Last year of crash data: Project-level crash data available? No Segment crash data available? No Last year of crash data: Project-level crash data available? No Segment crash data available? No Segment crash data available? No Segment crash data: Project-level crash data available? No Last year of crash data: Project-level crash data available? No Last year of crash data: Project-level crash data available? No Last year of crash data: Project-level crash data available? No Last year of crash data: Project-level crash data available? No Last year of crash data: Project-level crash data available? No Last year of crash data: Project-level crash data available? No Last year of crash data: Project-level crash data available? No Last year of crash data: Project-level crash data available? No Last year of crash data: Project-level crash data available? No Last year of crash data: Project-level crash data available? No Last year of crash data: Project-level crash data available? No Last year of crash data: Project-level crash data available? No Last year of crash data: Project-level crash data: Project-level crash data: Project-level crash data: Project-level crash data available? No Last year of crash data: Project-level crash data: Project-level crash data: Project-level crash data: Project-level crash data: Project-level crash data: Project-level crash data: Project-level crash data: Project-level crash data: Project-level crash data: Project-level crash data: Project-level crash data: Project-level crash data: Project-level crash data: Project-level crash data: Pro									, ,
Project-level crash data available? No Last year of crash data:			No First year of areah data:				avail-1-1-0		
Ramp segments				•		_			Freeway segments
Project-level crash data available? No Last year of crash data: Segment crash data available? No First year of crash data: Project-level crash data available? No Last year of crash data: Project-level crash data available? No Last year of crash data: Project-level crash data available? No Last year of crash data: Project-level crash data available? No Last year of crash data: Project-level crash data available? No Last year of crash data: Project-level crash data available? No Last year of crash data: Project-level crash data available? No Last year of crash data: Project-level crash data available? No Last year of crash data: Project-level crash data:				•		?		-	
Ramp terminals				,					Ramp segments
Project-level crash data available?		1:	crash data:	Last year o	No	?	ata available	Project-level crash da	
Stimated Crash Statistics Total K A B C		a:	f crash data:	First year o	No				Ramp terminals
Total K		1:	crash data:	Last year o	No	?	ata available	Project-level crash da	
Estimated number of crashes during Study Period, crashesy:								atistics	Estimated Crash Sta
Stimated average crash freq, during Study Period, crashestyr: 131.8 0.4 1.9 11.4 41.6 Crashes by Facility Component Nbr. Sites Total K	PDO	С	В	Α	K	Total		acility	Crashes for Entire F
Stimated average crash freq, during Study Period, crashestyr: 131.8 0.4 1.9 11.4 41.6 Crashes by Facility Component Nbr. Sites Total K	1.0 1452.4	791.0	217.4	35.4	8.2	2504.4	shes:	es during Study Period, cras	Estimated number of crash
Nbr. Sites Total K									
Treeway segments, crashes: 10	PDO								·
Ramp segments, crashes: 11 297.3 3.2 9.7 50.2 99.1	_							-	
Crossroad ramp terminals, crashes: 2 699.6 0.5 13.3 79.1 358.4									
Crashes for Entire Facility by Year Year Total K A B C									
Estimated number of crashes during the Study Period, crashes: 2028									
the Study Period, crashes: 2028	PDO								
2029								· ·	
2030		-						shes:	the Study Period, cra
2031 131.8 0.4 1.9 11.4 41.6									
2032					0.4				
2033	1.6 76.4	41.6	11.4	1.9	0.4	131.8	2031		
2033	1.6 76.4	41.6	11.4	1.9	0.4	131.8	2032		
2034	1.6 76.4	41.6	11.4	1.9	0.4		2033		
2035									
2036									
2037		-			_				
2038									
2039									
2040					_				
2041									
2042									
2043					_				
2044									
2045									
2046									
2047	1.6 76.4	41.6	11.4	1.9	0.4	131.8	2045		
2048 2049 2050									
2048 2049 2050							2047		
2049 2050									
Distribution of Crashes for Entire Facility Crash Type Crash Type Category Estimated Number of Crashes During the Study Per Total K A B C									
Distribution of Crashes for Entire Facility Crash Type Crash Type Category Estimated Number of Crashes During the Study Per Total K A B C Multiple vehicle Head-on crashes: 13.3 0.1 0.3 1.9 6.9 Right-angle crashes: 198.6 0.3 3.8 22.8 101.1 Rear-end crashes: 1383.1 4.4 20.0 123.8 464.5 Sideswipe crashes: 392.7 0.9 3.1 20.0 70.6 Other multiple-vehicle crashes: 63.4 0.4 1.3 7.6 21.0									
Crash Type Estimated Number of Crashes During the Study Per Total K A B Crashes During the Study Per Total K A B C Multiple vehicle Head-on crashes: 13.3 0.1 0.3 1.9 6.9 <								hes for Entire Facility	Distribution of Cras
Total K A B C	dy Period	the Study	es Durina f	er of Crash	ed Numb	Estima		1	
Multiple vehicle Head-on crashes: 13.3 0.1 0.3 1.9 6.9 Right-angle crashes: 198.6 0.3 3.8 22.8 101.1 Rear-end crashes: 1383.1 4.4 20.0 123.8 464.5 Sideswipe crashes: 392.7 0.9 3.1 20.0 70.6 Other multiple-vehicle crashes: 63.4 0.4 1.3 7.6 21.0	PDO						egory	Crash Type Cat	Crash Type
Right-angle crashes: 198.6 0.3 3.8 22.8 101.1 Rear-end crashes: 1383.1 4.4 20.0 123.8 464.5 Sideswipe crashes: 392.7 0.9 3.1 20.0 70.6 Other multiple-vehicle crashes: 63.4 0.4 1.3 7.6 21.0								Head-on crashes:	Multiple vehicle
Rear-end crashes: 1383.1 4.4 20.0 123.8 464.5 Sideswipe crashes: 392.7 0.9 3.1 20.0 70.6 Other multiple-vehicle crashes: 63.4 0.4 1.3 7.6 21.0									manipie veniole
Sideswipe crashes: 392.7 0.9 3.1 20.0 70.6 Other multiple-vehicle crashes: 63.4 0.4 1.3 7.6 21.0									
Other multiple-vehicle crashes: 63.4 0.4 1.3 7.6 21.0									
· · · · · · · · · · · · · · · · · · ·									
Total multiple vehicle arealised 0064 4 006 470 0 004 0									
		664.0	176.0	28.5	6.1	2051.1	le crashes:		
Single vehicle Crashes with animal: 4.9 0.0 0.0 0.1 0.3									Single vehicle
Crashes with fixed object: 329.8 1.6 4.9 29.3 89.1	9.1 205.0	89.1	29.3		1.6	329.8	ject:	Crashes with fixed ob	
Crashes with other object: 40.6 0.1 0.2 1.6 5.5	5.5 33.2	5.5	1.6	0.2	0.1	40.6	oject:	Crashes with other of	
Crashes with parked vehicle: 6.6 0.0 0.1 0.6 1.8		1.8	0.6		0.0				
Other single-vehicle crashes 71.5 0.5 1.7 9.9 30.3									
Total single-vehicle crashes: 453.3 2.2 6.9 41.4 127.0									
Total crashes: 2504.4 8.2 35.4 217.4 791.0								· · ·	

			Evalua	tion Site S	ummarv			
General In	formation				y			
Project des		ISATe_GV	VMP					
Analyst:		AS	Date:	1/31/2022		Area type:	Urban	
First year o	of analysis	2027	Total length of freewa		s for Study	Period (mi)	0.240	
Last year o		2045		.,	G.uuy		J J	
Site Desci								
Freeway S								
Number	Lanes	Study Pariod	Study Period Descrip	tion				
Nullipel	Lailes		-	uon		1		
1	4	Length (mi) 0.240	GWMP					
2	0	0.240						
3	0	0.000	0					
			0					
4	0	0.000	0					
5	0	0.000	0					
6	0	0.000	0					
7	0	0.000	0					
8	0	0.000	0			1		
9	0	0.000	0			1		
10	0	0.000	0			1		
11	0	0.000	0			1		
12	0	0.000	0			1		
13	0	0.000	0			1		
14	0	0.000	0			1		
15	0	0.000	0			1		
16	0	0.000	0					
17	0	0.000	0			1		
18	0	0.000	0			1		
19	0	0.000	0			1		
20	0	0.000	0			<u> </u>		
Ramp Seg								
	Study Peri			Number	Study Per			
	Description	1			Descriptio	n		
	0			21	0			
	0			22	0			
	0			23	0			
	0			24	0			
	0			25	0			
	0			26	0			
	0			27	0			
	0			28	0			
	0			29	0			
10	0			30	0			
	0			31	0			
	0			32	0			
	0			33	0			
14	0			34	0			
15	0			35	0			
-	0			36	0			
17	0			37	0			
18	0			38	0			
19	0			39	0			
20	0			40	0			
	d Ramp Te		Ia : :			1		
Number	Config.	Control	Study Period Descrip	tion				
1 tallibor	Comig.							
1	0	0	0					
1	_	0	0					
	0							
1 2	0	0	0					
1 2 3	0 0 0	0 0	0					

		Out	put Summa	ırv				
General Information	1		,					
Project description:	IISATe GWMP							
Analyst:	AS	Date:	1/31/2022		Area type:		Urban	
First year of analysis		Date.	1,01/2022		, aoa typo.		CIDUII	
Last year of analysis								
Crash Data Descrip								
		available?	I	No	Eiret voor o	of crach dat	a. I	
Freeway segments	Segment crash data		2		First year of crash data: Last year of crash data:			
	Project-level crash da		17	No				
Ramp segments	Segment crash data		_	No	,	of crash dat		
	Project-level crash da		?	No		of crash data		
Ramp terminals	Segment crash data			No		of crash dat		
	Project-level crash da	ata available	?	No	Last year c	of crash data	a:	
Estimated Crash St	atistics							
Crashes for Entire	Facility		Total	K	Α	В	С	PDO
Estimated number of cras	hes during Study Period, cra	shes:	50.7	0.4	0.8	6.0	10.6	32.8
	req. during Study Period, cra		2.7	0.0	0.0	0.3	0.6	1.7
Crashes by Facility		Nbr. Sites	Total	K	Α	В	С	PDO
Freeway segments,		1	50.7	0.4	0.8	6.0	10.6	32.8
Ramp segments. cra		0	0.0	0.0	0.0	0.0	0.0	0.0
Crossroad ramp tern		0	0.0	0.0		0.0	0.0	0.0
Crashes for Entire		Year	Total	K	A	B	C	PDO
Estimated number of	•	2027	2.7	0.0	0.0	0.3	0.6	1.7
the Study Period, cra	isnes:	2028	2.7	0.0		0.3	0.6	1.7
		2029	2.7	0.0		0.3	0.6	1.7
		2030	2.7	0.0	0.0	0.3	0.6	1.7
		2031	2.7	0.0	0.0	0.3	0.6	1.7
		2032	2.7	0.0	0.0	0.3	0.6	1.7
		2033	2.7	0.0	0.0	0.3	0.6	1.7
		2034	2.7	0.0	0.0	0.3	0.6	1.7
		2035	2.7	0.0	0.0	0.3	0.6	1.7
		2036	2.7	0.0	0.0	0.3	0.6	1.7
		2037	2.7	0.0	0.0	0.3	0.6	1.7
		2038	2.7	0.0	0.0	0.3	0.6	1.7
		2039	2.7	0.0	0.0	0.3	0.6	1.7
		2040	2.7	0.0	0.0	0.3	0.6	1.7
		2040	2.7	0.0	0.0	0.3	0.6	1.7
		2041						
			2.7	0.0	0.0	0.3	0.6	1.7
		2043	2.7	0.0		0.3	0.6	1.7
		2044	2.7	0.0	0.0	0.3	0.6	1.7
		2045	2.7	0.0	0.0	0.3	0.6	1.7
		2046						
		2047						
		2048						
		2049						
		2050						
Distribution of Cras	has for Entire Facilit	<i>y</i>	·				•	
						the Study	Pariod	
			Estimat	ed Numb	er of Crash	ies During	tile Study	CIICG
Crash Type	Crash Type Ca	tegory	Estimat Total	ed Numb K	er of Crash A	es During B	C	PDO
Crash Type	Crash Type Ca	tegory	Total	K	Α	В	С	PDO
	Crash Type Car Head-on crashes:	tegory	Total 0.1	K	A 0.0	B 0.0	C 0.0	PDO 0.0
Crash Type	Crash Type Car Head-on crashes: Right-angle crashes:	tegory	7otal 0.1 0.6	0.0 0.0	0.0 0.0	B 0.0 0.1	0.0 0.2	9DO 0.0 0.4
Crash Type	Crash Type Car Head-on crashes: Right-angle crashes: Rear-end crashes:	tegory	7otal 0.1 0.6 20.3	0.0 0.0 0.2	0.0 0.0 0.3	0.0 0.1 2.5	0.0 0.2 4.3	9DO 0.0 0.4 13.0
Crash Type	Crash Type Cat Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes:		Total 0.1 0.6 20.3 7.5	0.0 0.0 0.2 0.0	0.0 0.0 0.3 0.1	B 0.0 0.1 2.5 0.6	0.0 0.2 4.3 1.1	9DO 0.0 0.4 13.0 5.7
Crash Type	Crash Type Car Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle	e crashes:	Total 0.1 0.6 20.3 7.5 0.7	0.0 0.0 0.2 0.0 0.0	0.0 0.0 0.3 0.1 0.0	B 0.0 0.1 2.5 0.6 0.1	0.0 0.2 4.3 1.1 0.2	9DO 0.0 0.4 13.0 5.7 0.4
Crash Type Multiple vehicle	Crash Type Car Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehicle	e crashes:	7otal 0.1 0.6 20.3 7.5 0.7 29.2	0.0 0.0 0.2 0.0 0.0 0.0	0.0 0.0 0.3 0.1 0.0 0.4	B 0.0 0.1 2.5 0.6 0.1 3.3	0.0 0.2 4.3 1.1 0.2 5.7	9DO 0.0 0.4 13.0 5.7 0.4 19.5
Crash Type	Crash Type Car Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehicle Crashes with animal:	e crashes:	7otal 0.1 0.6 20.3 7.5 0.7 29.2 0.3	0.0 0.0 0.2 0.0 0.0 0.0 0.0	0.0 0.0 0.3 0.1 0.0 0.4	B 0.0 0.1 2.5 0.6 0.1 3.3 0.0	0.0 0.2 4.3 1.1 0.2 5.7 0.0	9DO 0.0 0.4 13.0 5.7 0.4 19.5 0.3
Crash Type Multiple vehicle	Crash Type Car Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehicl Crashes with animal: Crashes with fixed of	e crashes: e crashes: pject:	7otal 0.1 0.6 20.3 7.5 0.7 29.2 0.3 15.4	0.0 0.0 0.2 0.0 0.0 0.0 0.2 0.0	0.0 0.0 0.3 0.1 0.0 0.4 0.0 0.3	8 0.0 0.1 2.5 0.6 0.1 3.3 0.0 2.0	0.0 0.2 4.3 1.1 0.2 5.7 0.0 3.5	9DO 0.0 0.4 13.0 5.7 0.4 19.5 0.3 9.5
Crash Type Multiple vehicle	Crash Type Car Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehicle Crashes with animal: Crashes with fixed of Crashes with other of	e crashes: e crashes: oject: oject:	7otal 0.1 0.6 20.3 7.5 0.7 29.2 0.3	0.0 0.0 0.2 0.0 0.0 0.0 0.0	0.0 0.0 0.3 0.1 0.0 0.4	B 0.0 0.1 2.5 0.6 0.1 3.3 0.0	0.0 0.2 4.3 1.1 0.2 5.7 0.0	9DO 0.0 0.4 13.0 5.7 0.4 19.5 0.3 9.5
Crash Type Multiple vehicle	Crash Type Car Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehicl Crashes with animal: Crashes with fixed of	e crashes: e crashes: oject: oject:	7otal 0.1 0.6 20.3 7.5 0.7 29.2 0.3 15.4	0.0 0.0 0.2 0.0 0.0 0.0 0.2 0.0	0.0 0.0 0.3 0.1 0.0 0.4 0.0 0.3 0.3	8 0.0 0.1 2.5 0.6 0.1 3.3 0.0 2.0	0.0 0.2 4.3 1.1 0.2 5.7 0.0 3.5	9DO 0.0 0.4 13.0 5.7 0.4 19.5
Crash Type Multiple vehicle	Crash Type Car Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehicle Crashes with animal: Crashes with fixed of Crashes with other of	e crashes: ele crashes: oject: oject: vehicle:	7otal 0.1 0.6 20.3 7.5 0.7 29.2 0.3 15.4 2.5	0.0 0.0 0.2 0.0 0.0 0.0 0.2 0.0 0.1	0.0 0.0 0.3 0.1 0.0 0.4 0.0 0.3 0.3 0.0	B 0.0 0.1 2.5 0.6 0.1 3.3 0.0 2.0 0.2	0.0 0.2 4.3 1.1 0.2 5.7 0.0 3.5 0.3	9DO 0.0 0.4 13.0 5.7 0.4 19.5 0.3 9.5
Crash Type Multiple vehicle	Crash Type Car Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehicle Crashes with animal: Crashes with fixed of Crashes with other of Crashes with parked	e crashes: ele crashes: oject: oject: vehicle: crashes	7otal 0.1 0.6 20.3 7.5 0.7 29.2 0.3 15.4 2.5 0.3	0.0 0.0 0.2 0.0 0.0 0.0 0.2 0.0 0.1 0.0	0.0 0.0 0.3 0.1 0.0 0.4 0.0 0.3 0.3 0.0	8 0.0 0.1 2.5 0.6 0.1 3.3 0.0 2.0 0.2	0.0 0.2 4.3 1.1 0.2 5.7 0.0 3.5 0.3	9DO 0.0 0.4 13.0 5.7 0.4 19.5 0.3 9.5 2.0

			Evalua	tion Site S	ummarv			
General In	nformation		Lvaiac	tion one o	aimmai y			
Project des			n Fields Road to I-270	Ramps Ph	ase 1 Ruild	1		
Analyst:	oription.	DK	Date:	1/31/2022		Area type:	Urban	
	of analysis:	2027	Total length of freewa			Period (mi)	1.200	
	of analysis:	2045	Total length of freewo	ay segment	s ioi Study	renou (IIII)	1.200	
		2043						
Site Desci								
Freeway S	_	1	10					
Number	Lanes		Study Period Descrip	ition				
		Length (mi)						
1	6	0.020	GP MP 0.25 - MP 0.27					
2	6	0.170	GP MP 0.27 - MP 0.44					
3	5	0.040	GP MP 0.44 - MP 0.48					
4	5	0.140	GP MP 0.48 - MP 0.62					
5	5	0.120	GP MP 0.62 - MP 0.74					
6	4	0.180	GP MP 0.74 - MP 0.92					
7	5	0.250	GP MP 0.92 - MP 1.17					
8	5	0.010	GP MP 1.17 - MP 1.18					J
9	6	0.010	GP MP 1.18 - MP 1.19					
10	7	0.260	GP MP 1.19 - MP 1.45					
11	0	0.200	0					
12	0	0.000	0					
								J
13	0	0.000	0					
14	0	0.000	0					
15	0	0.000	0					J
16	0	0.000	0					
17	0	0.000	0					
18	0	0.000	0					J
19	0	0.000	0					
20	0	0.000	0					1
Ramp Seg	ments							
	Study Peri	od		Number	Study Peri	hoi		
					Ctady i Cii	-		
	Description	า			Description			
		า 370 WB to Wa		21				
1		370 WB to Wa			Description			
1 2	Ramp from I-	370 WB to Wa /ashingtonian		21	Description 0			
1 2 3	Ramp from I- Ramp from V Ramp from F	370 WB to Wa /ashingtonian		21 22 23	Description 0 0			
1 2 3 4	Ramp from I- Ramp from W Ramp from F Ramp from W	370 WB to Wa /ashingtonian ields Rd/Sam		21 22 23 24	Description 0 0 0 0			
1 2 3 4 5	Ramp from I- Ramp from W Ramp from F Ramp from W 0	370 WB to Wa /ashingtonian ields Rd/Sam		21 22 23 24 25	Description 0 0 0 0 0 0			
1 2 3 4 5	Ramp from I- Ramp from W Ramp from F Ramp from W 0 0	370 WB to Wa /ashingtonian ields Rd/Sam		21 22 23 24 25 26	Description 0 0 0 0 0 0 0 0			
1 2 3 4 5 6 7	Ramp from I- Ramp from W Ramp from F Ramp from W 0 0 0	370 WB to Wa /ashingtonian ields Rd/Sam		21 22 23 24 25 26 27	Description 0 0 0 0 0 0 0 0 0 0 0 0			
1 2 3 4 5 6 7 8	Ramp from I- Ramp from W Ramp from F Ramp from W 0 0 0	370 WB to Wa /ashingtonian ields Rd/Sam		21 22 23 24 25 26 27 28	Description 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			
1 2 3 4 5 6 7 8 9	Ramp from I- Ramp from W Ramp from F Ramp from W 0 0 0 0	370 WB to Wa /ashingtonian ields Rd/Sam		21 22 23 24 25 26 27 28 29	Description 0 0 0 0 0 0 0 0 0 0 0 0			
1 2 3 4 5 6 7 8 9 10	Ramp from I- Ramp from W Ramp from F Ramp from W 0 0 0 0 0	370 WB to Wa /ashingtonian ields Rd/Sam		21 22 23 24 25 26 27 28 29 30	Description 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			
1 2 3 4 5 6 7 8 9 10 11	Ramp from I- Ramp from W Ramp from F Ramp from W 0 0 0 0 0 0	370 WB to Wa /ashingtonian ields Rd/Sam		21 22 23 24 25 26 27 28 29 30 31	Description 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			
1 2 3 4 5 6 7 8 9 10 11	Ramp from I- Ramp from W Ramp from F Ramp from W 0 0 0 0 0 0	370 WB to Wa /ashingtonian ields Rd/Sam		21 22 23 24 25 26 27 28 29 30 31 32	Description 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			
1 2 3 4 5 6 7 8 9 10 11 12 13	Ramp from I- Ramp from W Ramp from F Ramp from W 0 0 0 0 0 0 0 0	370 WB to Wa /ashingtonian ields Rd/Sam		21 22 23 24 25 26 27 28 29 30 31 32 33	Description 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			
1 2 3 4 5 6 7 8 9 10 11 12 13 14	Ramp from I- Ramp from W Ramp from F Ramp from W 0 0 0 0 0 0 0 0 0	370 WB to Wa /ashingtonian ields Rd/Sam		21 22 23 24 25 26 27 28 29 30 31 32 33 34	Description 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	Ramp from I- Ramp from W Ramp from F Ramp from W 0 0 0 0 0 0 0 0 0	370 WB to Wa /ashingtonian ields Rd/Sam		21 22 23 24 25 26 27 28 29 30 31 32 33 34 35	Description 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	Ramp from I- Ramp from W Ramp from F Ramp from W 0 0 0 0 0 0 0 0 0	370 WB to Wa /ashingtonian ields Rd/Sam		21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36	Description 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	Ramp from I- Ramp from W Ramp from F Ramp from W 0 0 0 0 0 0 0 0 0	370 WB to Wa /ashingtonian ields Rd/Sam		21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37	Description 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17	Ramp from I- Ramp from W Ramp from W 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	370 WB to Wa /ashingtonian ields Rd/Sam		21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36	Description 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	Ramp from I- Ramp from W Ramp from W 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	370 WB to Wa /ashingtonian ields Rd/Sam		21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38	Description 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17	Ramp from I- Ramp from W Ramp from W 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	370 WB to Wa /ashingtonian ields Rd/Sam		21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37	Description 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	Ramp from I- Ramp from W Ramp from W 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	370 WB to Wa /ashingtonian ields Rd/Sam /ashingtonian		21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39	Description 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	Ramp from I- Ramp from W Ramp from W 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	370 WB to Wa /ashingtonian ields Rd/Sam /ashingtonian		21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40	Description 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 Crossroad	Ramp from I- Ramp from W Ramp from W 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	370 WB to Wa /ashingtonian ields Rd/Sam /ashingtonian		21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40	Description 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 Crossroad Number	Ramp from I- Ramp from W Ramp from W 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Config.	arminals Control Signal	Study Period Descrip Washingtonian Blvd at I-3	21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40	Description 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 Crossroad Number 1 2	Ramp from I- Ramp from W Ramp from W 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Config.	arminals Control	Study Period Descrip	21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40	Description 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 Crossroad Number 1 2 3	Ramp from I- Ramp from W Ramp from W 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Config. D4 D4 D4 0	arminals Control Signal O Signal O Control Control	Study Period Descrip Washingtonian Blvd at I-3' Washingtonian Blvd at I-3'	21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40	Description 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 Crossroad Number 1 2 3 4	Ramp from I- Ramp from W Ramp from W 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	rminals Control Signal O O	Study Period Descrip Washingtonian Blvd at I-3' Washingtonian Blvd at I-3'	21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40	Description 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 Crossroad Number 1 2 3	Ramp from I- Ramp from W Ramp from W 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Config. D4 D4 D4 0	arminals Control Signal O Signal O Control Control	Study Period Descrip Washingtonian Blvd at I-3' Washingtonian Blvd at I-3'	21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40	Description 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			

		Out	put Summa	arv				
General Information	n		,	,				
Project description:	I-370 From Fields Ro	ad to I-270 I	Ramps Pha	se 1 Build				
Analyst:	DK		1/31/2022		Area type:	li li	Jrban	
First year of analysis		Date.	170 172022		r a ca typo.		o i bai i	
Last year of analysis								
Crash Data Descrip								
	Segment crash data	available?		No	First year of crash data:			
Freeway segments					First year of crash data: Last year of crash data:			
	Project-level crash da		17	No				
Ramp segments	Segment crash data			No	,	f crash data		
	Project-level crash da		?	No		f crash data		
Ramp terminals	Segment crash data			No		f crash data		
	Project-level crash da	ata available	?	No	Last year o	f crash data	1:	
Estimated Crash St	tatistics							
Crashes for Entire	Facility		Total	K	Α	В	С	PDO
Estimated number of cras	hes during Study Period, cra	shes:	343.3	1.8	5.3	35.1	81.7	219.4
Estimated average crash	freq. during Study Period, cra	ashes/yr:	18.1	0.1	0.3	1.8	4.3	11.5
Crashes by Facility	Component	Nbr. Sites	Total	K	Α	В	С	PDO
Freeway segments,		10	261.9	1.6	4.2	28.8	60.5	166.8
Ramp segments, cra		4	11.4	0.2	0.5	2.2	2.8	5.8
Crossroad ramp tern		2	70.0	0.2	0.7	4.1	18.3	46.8
Crashes for Entire		Year	Total	K	A	B 4.1	C	PDO
Estimated number of	•	2027	18.1	0.1	0.3	1.8	4.3	11.5
the Study Period, cra	asnes:	2028	18.1	0.1	0.3	1.8	4.3	11.5
		2029	18.1	0.1	0.3	1.8	4.3	11.5
		2030	18.1	0.1	0.3	1.8	4.3	11.5
		2031	18.1	0.1	0.3	1.8	4.3	11.5
		2032	18.1	0.1	0.3	1.8	4.3	11.5
		2033	18.1	0.1	0.3	1.8	4.3	11.5
		2034	18.1	0.1	0.3	1.8	4.3	11.5
		2035	18.1	0.1	0.3	1.8	4.3	11.5
		2036	18.1	0.1	0.3	1.8	4.3	11.5
		2037	18.1	0.1	0.3	1.8	4.3	11.5
		2038	18.1	0.1	0.3	1.8	4.3	11.5
		2039	18.1	0.1	0.3	1.8	4.3	11.5
		2040	18.1	0.1	0.3	1.8	4.3	11.5
		2041	18.1	0.1	0.3	1.8	4.3	11.5
		2042	18.1	0.1	0.3	1.8	4.3	11.5
		2043	18.1	0.1	0.3	1.8	4.3	11.5
		2044	18.1	0.1	0.3	1.8	4.3	11.5
		2045	18.1	0.1	0.3	1.8	4.3	11.5
		2046						
		2047						
		2048						
		2049						
		2050	†					
Distribution of Cras	shes for Entire Facilit							
			Estimat	ed Numb	er of Crash	es Durina	the Study	Period
Crash Type	Crash Type Car	tegory	Total	K	A	В	C	PDO
						_		
	Head-on crashes:		1 2	በበ	0.01	ロンロ	() 41	0.5
Multiple vehicle	Head-on crashes:		1.2	0.0	0.0	0.2	0.4 5.7	0.5
	Right-angle crashes:		19.6	0.0	0.2	1.5	5.7	12.1
	Right-angle crashes: Rear-end crashes:		19.6 150.0	0.0	0.2 2.1	1.5 14.3	5.7 37.7	12.1 95.2
	Right-angle crashes: Rear-end crashes: Sideswipe crashes:	o orogle se	19.6 150.0 44.9	0.0 0.7 0.2	0.2 2.1 0.5	1.5 14.3 3.1	5.7 37.7 7.3	12.1 95.2 33.9
	Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle		19.6 150.0 44.9 4.9	0.0 0.7 0.2 0.0	0.2 2.1 0.5 0.1	1.5 14.3 3.1 0.5	5.7 37.7 7.3 1.1	12.1 95.2 33.9 3.2
Multiple vehicle	Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehicle	le crashes:	19.6 150.0 44.9 4.9 220.5	0.0 0.7 0.2 0.0 0.9	0.2 2.1 0.5 0.1 2.9	1.5 14.3 3.1 0.5 19.5	5.7 37.7 7.3 1.1 52.2	12.1 95.2 33.9 3.2 144.9
	Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehicl Crashes with animal:	cle crashes:	19.6 150.0 44.9 4.9 220.5 1.6	0.0 0.7 0.2 0.0 0.9	0.2 2.1 0.5 0.1 2.9 0.0	1.5 14.3 3.1 0.5 19.5 0.0	5.7 37.7 7.3 1.1 52.2 0.1	12.1 95.2 33.9 3.2 144.9 1.4
Multiple vehicle	Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehic Crashes with animal: Crashes with fixed ob	cle crashes:	19.6 150.0 44.9 4.9 220.5 1.6 89.0	0.0 0.7 0.2 0.0 0.9 0.0	0.2 2.1 0.5 0.1 2.9 0.0 1.7	1.5 14.3 3.1 0.5 19.5 0.0	5.7 37.7 7.3 1.1 52.2 0.1 21.0	12.1 95.2 33.9 3.2 144.9 1.4 54.4
Multiple vehicle	Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehice Total multiple-vehic Crashes with animal: Crashes with fixed ob	oject:	19.6 150.0 44.9 4.9 220.5 1.6	0.0 0.7 0.2 0.0 0.9	0.2 2.1 0.5 0.1 2.9 0.0	1.5 14.3 3.1 0.5 19.5 0.0 11.1	5.7 37.7 7.3 1.1 52.2 0.1	12.1 95.2 33.9 3.2 144.9 1.4
Multiple vehicle	Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehice Total multiple-vehice Crashes with animal: Crashes with fixed ob Crashes with other of Crashes with parked	oject: vehicle:	19.6 150.0 44.9 4.9 220.5 1.6 89.0	0.0 0.7 0.2 0.0 0.9 0.0 0.7 0.0	0.2 2.1 0.5 0.1 2.9 0.0 1.7	1.5 14.3 3.1 0.5 19.5 0.0 11.1 0.8	5.7 37.7 7.3 1.1 52.2 0.1 21.0	12.1 95.2 33.9 3.2 144.9 1.4 54.4 9.7
Multiple vehicle	Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicl Total multiple-vehicl Crashes with animal: Crashes with fixed ob Crashes with other of Crashes with parked Other single-vehicle	oject: bject: vehicle: crashes	19.6 150.0 44.9 4.9 220.5 1.6 89.0 12.1	0.0 0.7 0.2 0.0 0.9 0.0 0.7 0.0	0.2 2.1 0.5 0.1 2.9 0.0 1.7 0.1	1.5 14.3 3.1 0.5 19.5 0.0 11.1	5.7 37.7 7.3 1.1 52.2 0.1 21.0	12.1 95.2 33.9 3.2 144.9 1.4 54.4
Multiple vehicle	Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehice Total multiple-vehice Crashes with animal: Crashes with fixed ob Crashes with other of Crashes with parked	oject: bject: vehicle: crashes	19.6 150.0 44.9 4.9 220.5 1.6 89.0 12.1 1.8	0.0 0.7 0.2 0.0 0.9 0.0 0.7 0.0	0.2 2.1 0.5 0.1 2.9 0.0 1.7 0.1	1.5 14.3 3.1 0.5 19.5 0.0 11.1 0.8	5.7 37.7 7.3 1.1 52.2 0.1 21.0 1.5 0.4	12.1 95.2 33.9 3.2 144.9 1.4 54.4 9.7



Enhanced Interchange Safety Analysis Tool Output Summary & Evaluation Site Summary Reports for the Preferred Alternative

			Evalua	tion Site S	ummary			
General In	formation							
Project des	cription:	I-270 From	MD 117 to I-370_Pha	se 1 Build				
Analyst:		DK	Date:	1/31/22		Area type:		Urban
First year o	f analysis:	2027	Total length of freewa		for Study F		1.570	
Last year o		2045	J	, 0	,	,		
Site Descr								
Freeway S								
Number	Lanes	Chudu Daniad	Study Period Descript	ion		1		
Nullibel	Lanes	-	Study Feriod Descript	.1011				
	0	Length (mi)	OD MD 40 00 MD 40 05					
1	8		GP MP 10.90 - MP 10.65					
2	9	0.040	GP MP 10.65 - MP 10.61					
3	10	0.590	GP MP 10.61 - MP 10.02					
4	10	0.020	GP MP 10.02 - MP 10.00					
5	9	0.300	GP MP 10.00 - MP 9.70					
6	9	0.370	GP MP 9.70 - MP 9.33					
7	0	0.000	0					
8	0	0.000	0					
9	0	0.000	0					
10	0	0.000	0					
11	0	0.000	0					
12	0	0.000	0					
13	0	0.000	0					
13	0	0.000	0					
15 16	0	0.000	0					
16	0	0.000	0					
17	0	0.000	0					
18	0	0.000	0					
19	0	0.000	0					
20	0	0.000	0					
Ramp Seg								
	Study Perio			Number	Study Peri			
	Description				Descriptio	n		
		om I-270 NB to		21	0			
	-	om I-270 NB to		22	0			
	G6-31 Ramp	from MD 117 E		23	0			
4	G6-32 Ramp	from MD 117 t		24	0			
5	G6-4 Ramp fr	om MD 117 to		25	0			
6	NB CD MP 1.	82 - MP 1.63		26	0			
7	NB CD MP 1.	63 - MP 0.91		27	0			
8	NB CD MP 0.	91 - MP 0.45		28	0			
9	NB CD MP 0.	45 - MP 0.25		29	0			
10	0			30	0			
	0			31	0			
	0			32	0			
	0			33	0			
	0			34	0			
	0			35	0			
	0			36	0			
	-				-			
	0			37	0			
	0			38	0			
19	0			39	0			
20	0			40	0			
	Ramp Ter					T		
Number	Config.	Control	Study Period Descript	ion				
1	D3ex	Signal	MD 117 at I-270 NB					
2	D3en		MD 117 at I-270 SB					
3	0	0	0					
4	0	0	0					
5	0	0	0					
6	0	0	0					
U	U	U	٧			1		

		Out	tput Summa	ary				
General Information			.,	,				
Project description:	I-270 From N	MD 117 to I-370 Phas	se 1 Build					
Analyst:	DK	Date:	1/31/22		Area type:	I	Urban	
First year of analysis:	2027	ı			, 71			
Last year of analysis:	2045							
Crash Data Descripti	ion							
Freeway segments		sh data available?		No	First vear o	f crash data	: 1	
		crash data available?	>	No	,	f crash data		
Ramp segments	,	sh data available?		No		f crash data		
ramp cogmonic		crash data available?	>	No	•	f crash data		
Ramp terminals		sh data available?		No		f crash data		
. tamp tommalo		crash data available?	>	No		f crash data		
Estimated Crash Sta					,			
Crashes for Entire Fa			Total	K	Α	В	С	PDO
Estimated number of crashe		Period crashes:	2844.5	10.4	32.5	184.0	652.2	1965.4
Estimated average crash fre			149.7	0.5	1.7	9.7	34.3	103.4
Crashes by Facility (Nbr. Sites	Total	K	Α	В	C	PDO
Freeway segments, cr	_	Nor. Sites	2145.2	8.1		127.7	450.6	1536.2
Ramp segments, cras		9	321.4	1.7	5.3	27.8	75.0	211.6
Crossroad ramp termin			377.9	0.6		28.5	126.6	217.6
Crashes for Entire Fa			Total	K	A	B	C	PDO
Estimated number of on the Study Period, cras	,	g 2027 2028	149.7 149.7	0.5 0.5	1.7 1.7	9.7 9.7	34.3 34.3	103.4 103.4
the Study Period, cras	nes.					-		
		2029 2030	149.7 149.7	0.5 0.5	1.7 1.7	9.7 9.7	34.3 34.3	103.4 103.4
		2030	149.7	0.5	1.7	9.7	34.3	103.4
		2031	149.7	0.5	1.7	9.7	34.3	103.4
		2032	149.7	0.5	1.7	9.7	34.3	103.4
		2033	149.7	0.5	1.7	9.7	34.3	103.4
		2035	149.7	0.5	1.7	9.7	34.3	103.4
		2036	149.7	0.5	1.7	9.7	34.3	103.4
		2037	149.7	0.5	1.7	9.7	34.3	103.4
		2038	149.7	0.5	1.7	9.7	34.3	103.4
		2039	149.7	0.5	1.7	9.7	34.3	103.4
		2040	149.7	0.5	1.7	9.7	34.3	103.4
		2041	149.7	0.5	1.7	9.7	34.3	103.4
		2042	149.7	0.5	1.7	9.7	34.3	103.4
		2043	149.7	0.5	1.7	9.7	34.3	103.4
		2044	149.7	0.5	1.7	9.7	34.3	103.4
		2045	149.7	0.5	1.7	9.7	34.3	103.4
		2046 2047						
		2048 2049						
		2049						
Distribution of Crash	oc for Entire							
Distribution of Crash	es ioi Entire	: raciiily	Entime	tod Numb	or of Crosh	oe Durina 4	ho Ctudy F	Poriod
Crash Type	Crash	Type Category	Total	tea Numb K	er of Crash A	es During t	C C	PDO
Multiple vehicle	Hood on or-	ohoo:	13.3	0.1	0.3	1.5	5.4	
ividitiple verticle	Head-on cra Right-angle		167.3				58.2	6.1 92.6
	Right-angle of Rear-end cra		1527.8	0.4 5.8	2.3 17.9	13.8 101.6	361.1	92.6 1041.5
	Sideswipe cr		509.7	1.3		21.3	74.3	409.0
		le-vehicle crashes:	76.9	0.4	1.1	6.1	19.8	49.6
Cinala v-l-!-l-		ple-vehicle crashes:	2295.0	8.0	25.3	144.3	518.7	1598.8
Single vehicle	Crashes with		7.1	0.0	0.0	0.1	0.4	6.6
		n fixed object:	402.2	1.8	5.2	28.6	96.1	270.6
		n other object:	50.5	0.1	0.3	1.7	5.7	42.7
		n parked vehicle:	8.8	0.0		0.5	1.8	6.4
		vehicle crashes	80.8	0.5	1.6	8.8	29.4	40.4
		e-vehicle crashes: otal crashes:	549.5 2844.5	2.4 10.4	7.2 32.5	39.7 184.0	133.5 652.2	366.7 1965.4

			Evaluat	tion Site S	ummarv			
General In	formation				y			
Project des		I-270 From	I-370 to Shady Grove	Rd Phase	1 Build			
Analyst:		DK		1/31/22	. Dana	Area type:	Urban	
First year o		2027	Total length of freeway		for Study P		0.930	
Last year o		2045	Total length of neeway	, segments	ioi Otady i	criod (IIII).	0.000	
Site Descr		2043						
	•							
Freeway S	_		0			1		
Number	Lanes	-	Study Period Descripti	on				
		Length (mi)						
1	9	0.010	GP MP 9.33 - MP 9.32					
2	8	0.100	GP MP 9.32 - MP 9.22					
3	8	0.150	GP MP 9.22 - MP 9.07					
4	10	0.050	GP MP 9.07 - MP 9.02					
5	10	0.420	GP MP 9.01 - MP 8.59					
6	10	0.050	GP MP 8.59 - MP 8.54					
7	10	0.090	GP MP 8.54 - MP 8.45					
8	10	0.060	GP MP 8.45 - MP 8.39					
9	0	0.000	0					
10	0	0.000	0					
11	0	0.000	0					
12	0	0.000	0					
13	0	0.000	0					
13	0	0.000	0					
15								
	0	0.000	0					
16	0	0.000	0					
17	0	0.000	0					
18	0	0.000	0					
19	0	0.000	0					
20	0	0.000	0					
Ramp Seg				1				
	Study Perio			Number	Study Perio			
	Description				Description			
1	G1-2 Ramp fr	om I-270 NB t		21	M11-1 Ramp	from I-370 WB		
2	G1-3 Ramp fr	om I-270 to I-3		22	M11-2 Ramp	from I-370 to I		
3	-	om I-270 to I-3		23	M12-5 Ramp	from I-270 NB		
4	G2-5 Ramp fr	om I-370 WB 1		24	M9-6 Ramp fr	rom I-270 NB N		
5	G2-6 Ramp fr	om I-370 WB 1		25	M12-7 Ramp	from I-270 NB		
6	G2-7 Ramp fr	om I-370 WB 1		26	M12-8 Ramp	from I-270 NB		
7	G3-80 Ramp	from I-370 EB		27	M0-1 Ramp fr	rom I-270 NB N		
8	G3-81 Ramp	from I-370 EB		28	M0-2 Ramp fr	rom I-270 SB (
9	G3-82 Ramp	from I-370 EB		29	0			
10	G4-9 Ramp fr	om I-270 NB t		30	0			
11	G4-10 Ramp	from I-270 NB		31	0			
12	G5-11 Ramp	from I-270 SB		32	0			
13	G5-12 Ramp	from I-270 SB		33	0			
14	-	from I-370 EB		34	0			
15	-	from I-370 WB		35	0			
16		p from I-370 V		36	0			
17		from I-370 to I		37	0			
18		from I-270 SB		38	0			
19		from I-370 EB		39	0			
20		from I-370 EB		40	0			
	Ramp Ter			70	· ·			
Number	Config.		Study Period Descripti	on				
			_					
1	0	0	0					
2	0	0	0					
3	0	0	0					
4	0	0	0					
5	0	0	0					
6	0	0	0					

	eneral Information		tput Summa	ary				
General Information								
Project description:	I-270 From I-370 to	Shady Grove	Rd_Phase 1	l Build				
Analyst:	DK		1/31/22		Area type:		Urban	
First year of analysis:	2027	l						
Last year of analysis:	2045							
Crash Data Descript	ion							
Freeway segments	Segment crash data available?		Т	No	First year o	f crash data	·	
riceway segments	Project-level crash		2	No	•	f crash data		
Domn cogmonto	Segment crash data		:	No		f crash data		
Ramp segments			2					
D	Project-level crash			No	,	f crash data		
Ramp terminals	Segment crash data			No		f crash data		
	Project-level crash	data available'	?	No	Last year o	f crash data	:	
Estimated Crash Sta								
Crashes for Entire F	acility		Total	K	Α	В	С	PDO
Estimated number of crash	es during Study Period, cr	ashes:	1541.3	8.3	23.7	130.7	330.9	1047.8
Estimated average crash fr	eq. during Study Period, c	rashes/yr:	81.1	0.4	1.2	6.9	17.4	55.1
Crashes by Facility	Component	Nbr. Sites	Total	K	Α	В	С	PDO
Freeway segments, c		8	977.7	4.6		69.3	200.8	690.4
Ramp segments, cras		28	563.7	3.7	11.1	61.4	130.1	357.4
Crossroad ramp term		0	0.0	0.0	0.0	0.0	0.0	0.0
		Year	Total	K		B	C	PDO
Crashes for Entire F	<u> </u>				Α			_
Estimated number of	5	2027	81.1	0.4		6.9	17.4	55.1
the Study Period, cras	shes:	2028	81.1	0.4		6.9	17.4	55.1
		2029	81.1	0.4		6.9	17.4	55.1
		2030	81.1	0.4		6.9	17.4	55.1
		2031	81.1	0.4	1.2	6.9	17.4	55.1
		2032	81.1	0.4	1.2	6.9	17.4	55.1
		2033	81.1	0.4	1.2	6.9	17.4	55.1
		2034	81.1	0.4	1.2	6.9	17.4	55.1
		2035	81.1	0.4	1.2	6.9	17.4	55.1
		2036	81.1	0.4	1.2	6.9	17.4	55.1
		2037	81.1	0.4		6.9	17.4	55.1
		2038	81.1	0.4	1.2	6.9	17.4	55.1
		2039	81.1	0.4	1.2	6.9	17.4	55.1
		2040	81.1	0.4		6.9	17.4	55.1
		2040	81.1	0.4	1.2	6.9	17.4	55.1
		2041		0.4			17.4	
			81.1			6.9		55.1
		2043	81.1	0.4		6.9	17.4	55.1
		2044	81.1	0.4	1.2	6.9	17.4	55.1
		2045	81.1	0.4	1.2	6.9	17.4	55.1
		2046						
		2047						_
		2048						
		2049						
		2050						
Distribution of Crasi	hes for Entire Facili	ty				•		
			Estima	ted Numb	er of Crash	es During 1	the Study F	Period
Crash Type	Crash Type C	ategory	Total	K	Α	В	С	PDO
Multiple vehicle	Head-on crashes:		7.0	0.1	0.2	1.0	2.4	3.4
	Right-angle crashes	3.	18.4	0.1		1.8	5.0	11.1
		J.	775.8	4.3		67.0	176.9	515.6
					2.7	14.8	39.8	231.4
	Rear-end crashes:		200 7			14.0	39.0	4،1،4
	Sideswipe crashes:		289.7	1.0		6.0	40.0	20 5
	Sideswipe crashes: Other multiple-vehic	cle crashes:	63.6	0.4	1.2	6.9	16.6	38.5
	Sideswipe crashes: Other multiple-vehic Total multiple-veh	cle crashes: nicle crashes:	63.6 1154.6	0.4 5.8	1.2 16.5	91.5	240.7	800.0
Single vehicle	Sideswipe crashes: Other multiple-vehic Total multiple-vehic Crashes with anima	cle crashes: licle crashes: al:	63.6 1154.6 3.9	0.4 5.8 0.0	1.2 16.5 0.0	91.5 0.1	240.7 0.2	800.0
Single vehicle	Sideswipe crashes: Other multiple-vehic Total multiple-veh Crashes with anima Crashes with fixed of	cle crashes: nicle crashes: al: object:	63.6 1154.6 3.9 288.8	0.4 5.8	1.2 16.5 0.0 5.1	91.5	240.7	800.0 3.6 189.3
Single vehicle	Sideswipe crashes: Other multiple-vehic Total multiple-vehic Crashes with anima	cle crashes: nicle crashes: al: object:	63.6 1154.6 3.9	0.4 5.8 0.0	1.2 16.5 0.0	91.5 0.1	240.7 0.2	800.0 3.6 189.3
Single vehicle	Sideswipe crashes: Other multiple-vehic Total multiple-veh Crashes with anima Crashes with fixed of	cle crashes: nicle crashes: al: object: object:	63.6 1154.6 3.9 288.8	0.4 5.8 0.0 1.8	1.2 16.5 0.0 5.1 0.2	91.5 0.1 28.1	240.7 0.2 64.5	800.0
Single vehicle	Sideswipe crashes: Other multiple-vehic Total multiple-veh Crashes with anima Crashes with fixed c Crashes with other	cle crashes: nicle crashes: nl: object: object: d vehicle:	63.6 1154.6 3.9 288.8 30.0	0.4 5.8 0.0 1.8 0.1	1.2 16.5 0.0 5.1 0.2 0.1	91.5 0.1 28.1 1.3	240.7 0.2 64.5 3.5	800.0 3.6 189.3 24.9
Single vehicle	Sideswipe crashes: Other multiple-vehic Total multiple-veh Crashes with anima Crashes with fixed c Crashes with other Crashes with parke	cle crashes: nicle crashes: nl: object: object: d vehicle: e crashes	63.6 1154.6 3.9 288.8 30.0 4.8	0.4 5.8 0.0 1.8 0.1 0.0	1.2 16.5 0.0 5.1 0.2 0.1	91.5 0.1 28.1 1.3 0.5	240.7 0.2 64.5 3.5 1.1	800.0 3.6 189.3 24.9 3.1

			Evaluat	tion Site S	ummarv			1
General In	formation				y			
Project des		I-270 From	Shady Grove Rd to W	.Gude Dr 1	Phase 1 Bui	ild		
Analyst:		DK		1/31/22		Area type:	Urban	
First year o		2027	Total length of freeway		for Study F		0.810	
Last year o		2045	,		,	()		
Site Descr								
Freeway S								
Number	Lanes	Study Period	Study Period Descripti	on				
		Length (mi)						
1	10	0.070	GP MP 8.39 - MP 8.32					
2	10	0.110	GP MP 8.32 - MP 8.21					
3	10	0.050	GP MP 8.21 - MP 8.16					
4	10	0.040	GP MP 8.16 - MP 8.12					
5	10	0.330	GP MP 8.12 - MP 7.79					
6	10	0.210	GP MP 7.79- MP 7.58					
7	0	0.000	0					
8	0	0.000	0					
9	0	0.000	0					
10	0	0.000	0					
11	0	0.000	0					
12	0	0.000	0					
13	0	0.000						
13	0	0.000	0					
15	0	0.000	0					
16	0	0.000	0					
17	0	0.000	0					
18	0	0.000	0					
19	0	0.000	0					
20	0	0.000	0					
Ramp Seg		0.000	<u>U</u>					
	Study Perio	nd		Number	Study Peri	od		
	Description			raniboi	Description			
		om Shady Gro		21	0	•		
		om Shady Gro		22	0			
	-	om I-270 NB t		23	0			
	-	om I-270 NB t		24	0			
		om Shady Gro		25	0			
	G7-6 Ramp fr	om Shady Gro		26	0			
		om Shady Gro		27	0			
		om I-270 SB t		28	0			
9		om I-270 NB t		29	0			
10	-	from I-270 SI		30	0			
	0			31	0			
	0			32	0			
13	0			33	0			
14	0			34	0			
15	0			35	0			
	0			36	0			
17	0			37	0			
	0			38	0			
	0			39	0			
20	0			40	0			
Crossroad	Ramp Ter	minals						
Number	Config.	Control	Study Period Descripti	on				
1	A4	Signal	Shady Grove Road at I-270	NB				
2	A4	Signal	Shady Grove Road at I-270					
3	0	0	0					
4	0	0	0					
5	0	0	0					
6	0	0	0					

		Out	tput Summa	ary				
General Information								
Project description:	I-270 From Shad	y Grove Rd to W.	.Gude Dr_P	hase 1 Bui	ld			
Analyst:	DK	Date:	1/31/22		Area type:		Urban	
First year of analysis:	2027					•		
Last year of analysis:	2045							
Crash Data Descript	ion							
Freeway segments	Segment crash d	lata availahle?	I	No	First year o	f crash data	. 1	
i reeway segments			,	No	•			
D .		sh data available?	?			f crash data		
Ramp segments	Segment crash d			No		f crash data		
		sh data available?	?	No	,	f crash data		
Ramp terminals	Segment crash d			No		f crash data		
	Project-level cras	sh data available?	?	No	Last year of	f crash data	:	
Estimated Crash Sta	ntistics							
Crashes for Entire F	acility		Total	K	Α	В	С	PDO
Estimated number of crash	es during Study Period	crashes:	1177.4	4.1	16.2	89.4	312.9	754.8
Estimated average crash fr	• ,		62.0	0.2	0.9	4.7	16.5	39.7
								PDO
Crashes by Facility		Nbr. Sites	Total	K	Α	В	C	
Freeway segments, c		6	691.5	3.1		47.2	152.1	480.6
Ramp segments, cras		10	77.7	0.8		11.0	19.6	43.8
Crossroad ramp term	inals, crashes:	2	408.3	0.2	5.2	31.2	141.3	230.3
Crashes for Entire F	acility by Year	Year	Total	K	Α	В	С	PDO
Estimated number of		2027	62.0	0.2	0.9	4.7	16.5	39.7
the Study Period, cras	0	2028	62.0	0.2	0.9	4.7	16.5	39.7
uno oluuy renou, olas	31103.							
		2029	62.0	0.2	0.9	4.7	16.5	39.7
		2030	62.0	0.2	0.9	4.7	16.5	39.7
		2031	62.0	0.2	0.9	4.7	16.5	39.7
		2032	62.0	0.2	0.9	4.7	16.5	39.7
		2033	62.0	0.2	0.9	4.7	16.5	39.7
		2034	62.0	0.2	0.9	4.7	16.5	39.7
		2035	62.0	0.2	0.9	4.7	16.5	39.7
		2036	62.0	0.2	0.9	4.7	16.5	39.7
		2037	62.0	0.2	0.9	4.7	16.5	39.7
		2038	62.0	0.2	0.9	4.7	16.5	39.7
		2039	62.0	0.2	0.9	4.7	16.5	39.7
		2040	62.0	0.2	0.9	4.7	16.5	39.7
		2041	62.0	0.2	0.9	4.7	16.5	39.7
		2042	62.0	0.2	0.9	4.7	16.5	39.7
		2043	62.0	0.2	0.9	4.7	16.5	39.7
		2044	62.0	0.2	0.9	4.7	16.5	39.7
		2045	62.0	0.2	0.9	4.7	16.5	39.7
			0∠.0	0.2	0.9	4.7	10.5	აყ./
		2046						
		2047						
		2048						
		2049						
		2050						
Distribution of Crasi	hes for Entire Fac	cility	•				•	
		_	Estima	ted Numb	er of Crash	es Durina 1	the Study F	Period
Crash Type	Crash Type	e Category	Total	K	A	В	C	PDO
Multiple vehicle	Head-on crashes	, .	5.6	0.0		0.6	2.4	
ividitiple verticle								2.4
	Right-angle crasl		108.2	0.1		9.1	39.9	57.5
	Rear-end crashe		615.4	1.8		45.9	172.0	387.7
	Sideswipe crash		173.9	0.4	1.4	7.7	26.3	138.1
	Other multiple-ve	hicle crashes:	20.6	0.1	0.3	1.5	4.8	14.1
		ehicle crashes:	923.7	2.5	11.3	64.8	245.3	599.8
	I otal mullible-v				0.0	0.1	0.2	2.4
Single vehicle			2 61	1111		0.1	0.2	∠.4
Single vehicle	Crashes with ani	mal:	2.6	0.0		17 E	17.0	1167
Single vehicle	Crashes with ani Crashes with fixe	mal: ed object:	186.6	1.1	3.5	17.5	47.8	116.7
Single vehicle	Crashes with ani Crashes with fixe Crashes with oth	mal: ed object: er object:	186.6 20.6	1.1	3.5 0.2	0.9	2.7	16.7
Single vehicle	Crashes with ani Crashes with fixe Crashes with oth Crashes with par	mal: ed object: er object: ked vehicle:	186.6 20.6 3.8	1.1 0.1 0.0	3.5 0.2 0.1	0.9 0.3	2.7 0.9	16.7 2.4
Single vehicle	Crashes with ani Crashes with fixe Crashes with oth	mal: ed object: er object: ked vehicle:	186.6 20.6	1.1	3.5 0.2 0.1	0.9	2.7	16.7
Single vehicle	Crashes with ani Crashes with fixe Crashes with oth Crashes with par	mal: ed object: er object: ked vehicle: icle crashes	186.6 20.6 3.8	1.1 0.1 0.0	3.5 0.2 0.1 1.2	0.9 0.3	2.7 0.9	16.7 2.4

	Evaluation Site Summary								
General In	formation								
Project des		I-270 From	W.Gude Dr to N	MD 28	Phase 1 I	Build			
Analyst:		DK	Date		1/31/22		Area type:	L	Jrban
First year o	of analysis:	2027	Total length of f			for Study F		1.100	
Last year o		2045	· ·	•	Ü	,	, ,		
Site Descr									
Freeway S									
Number	Lanes	Study Period	Study Period De	escription	on				
		Length (mi)	,						
1	10		GP MP 7.57 - MP 6	.74					
2	10	0.100	GP MP 6.74 - MP 6						
3	10	0.070	GP MP 6.64 - MP 6						
4	10	0.080	GP MP 6.57 - MP 6						
5	10	0.020	GP MP 6.49 - MP 6						
6	0	0.000	0						
7	0	0.000	0						
8	0	0.000	0						
9	0	0.000	0						
10	0	0.000	0						
11	0	0.000	0						
12	0	0.000	0						
13	0	0.000	0						
14	0	0.000	0						
15	0	0.000	0						
16	0	0.000	0						
17	0	0.000	0						
18	0	0.000	0						
19	0	0.000	0						
20	0	0.000	0						
Ramp Seg		0.000	•				<u> </u>		
	Study Perio	nd			Number	Study Peri	od		
	Description				rannon	Description			
		from I-270 SB			21	0	•		
		from I-270 SB			22	0			
		from Gude Dr			23	0			
		from Gude Dr			24	0			
		from I-270 NB			25	0			
		from I-270 NB			26	0			
	0				27	0			
	0				28	0			
	0				29	0			
	0				30	0			
	0				31	0			
	0				32	0			
	0				33	0			
14	0				34	0			
	0				35	0			
	0				36	0			
17	0				37	0			
	0				38	0			
	0				39	0			
	0				40	0			
	Ramp Ter	rminals		1					
Number	Config.		Study Period De	escriptio	on				
1	0	0	0						
2	0	0	0						
3	0	0	0						
4	0	0	0						
5	0	0	0						
6	0	0	0						

		Out	tput Summa	ary				
General Information								
Project description:	I-270 From W.Gude	Dr to MD 28	_Phase 1 B	Build				
Analyst:	DK	Date:	1/31/22		Area type:		Urban	
First year of analysis:	2027	1				ı		
Last year of analysis:	2045							
Crash Data Descript	ion							
Freeway segments	Segment crash data	a available?		No	First year o	f crash data	·	
riceway segments	Project-level crash		2	No	•	f crash data		
Ramp segments	Segment crash data		•	No		f crash data		
Kamp segments			,					
D	Project-level crash of		?	No		f crash data		
Ramp terminals	Segment crash data			No		f crash data		
	Project-level crash	data avallable	?	No	Last year o	f crash data	:	
Estimated Crash Sta								
Crashes for Entire F	acility		Total	K	Α	В	С	PDO
Estimated number of crash	es during Study Period, cra	ashes:	1266.7	5.5	15.4	85.0	271.5	889.3
Estimated average crash fr	eq. during Study Period, c	rashes/yr:	66.7	0.3	0.8	4.5	14.3	46.8
Crashes by Facility	Component	Nbr. Sites	Total	K	Α	В	С	PDO
Freeway segments, c		5	1221.7	5.1	14.2	79.1	260.7	862.6
Ramp segments, cras		6	44.9	0.4	1.2	5.9	10.8	26.7
Crossroad ramp termi		0	0.0	0.0	0.0	0.0	0.0	0.0
Crashes for Entire F		Year	Total	K		В	C 0.0	PDO
	, , , 				Α			
Estimated number of	3	2027	66.7	0.3		4.5	14.3	46.8
the Study Period, cras	snes:	2028	66.7	0.3		4.5	14.3	46.8
		2029	66.7	0.3		4.5	14.3	46.8
		2030	66.7	0.3		4.5	14.3	46.8
		2031	66.7	0.3	0.8	4.5	14.3	46.8
		2032	66.7	0.3		4.5	14.3	46.8
		2033	66.7	0.3	0.8	4.5	14.3	46.8
		2034	66.7	0.3	0.8	4.5	14.3	46.8
		2035	66.7	0.3	0.8	4.5	14.3	46.8
		2036	66.7	0.3	0.8	4.5	14.3	46.8
	2037		66.7	0.3		4.5	14.3	46.8
		2038	66.7	0.3		4.5	14.3	46.8
		2039	66.7	0.3		4.5	14.3	46.8
		2040	66.7	0.3		4.5	14.3	46.8
		2040	66.7	0.3		4.5	14.3	46.8
		2041	66.7	0.3	0.8	4.5	14.3	46.8
		2043	66.7	0.3		4.5	14.3	46.8
		2044	66.7	0.3		4.5	14.3	46.8
		2045	66.7	0.3	0.8	4.5	14.3	46.8
		2046						
		2047						
		2048						
		2049						
		2050						
Distribution of Crasi	nes for Entire Facili	ty						
			Estima	ated Numb	er of Crash	es During t	the Study F	Period
Crash Type	Crash Type C	alegory	Total	K	Α	В	С	PDO
Multiple vehicle	Head-on crashes:		3.5	0.0	0.1	0.5	1.5	1.4
	Right-angle crashes	s:	20.2	0.1		1.8	5.8	12.2
	Rear-end crashes:		672.9	2.9		45.0	147.2	469.8
				2.0	10.9	35.7	180.4	
			220.7			10.9	55.7	100.4
	Sideswipe crashes:		229.7	0.7		1.0	6.0	16.4
	Sideswipe crashes: Other multiple-vehic	le crashes:	24.8	0.1	0.3	1.9	6.0	
	Sideswipe crashes: Other multiple-vehic Total multiple-veh	cle crashes: icle crashes:	24.8 951.2	0.1 3.9	0.3 10.8	60.0	196.3	680.2
Single vehicle	Sideswipe crashes: Other multiple-vehic Total multiple-veh Crashes with anima	cle crashes: icle crashes: I:	24.8 951.2 4.5	0.1 3.9 0.0	0.3 10.8 0.0	60.0 0.1	196.3 0.3	680.2 4.2
Single vehicle	Sideswipe crashes: Other multiple-vehic Total multiple-veh Crashes with anima Crashes with fixed of	cle crashes: icle crashes: il: object:	24.8 951.2 4.5 229.4	0.1 3.9 0.0 1.2	0.3 10.8 0.0 3.3	60.0 0.1 18.0	196.3 0.3 54.2	680.2 4.2 152.7
Single vehicle	Sideswipe crashes: Other multiple-vehic Total multiple-veh Crashes with anima Crashes with fixed of Crashes with other	cle crashes: icle crashes: l: object: object:	24.8 951.2 4.5 229.4 31.8	0.1 3.9 0.0 1.2 0.1	0.3 10.8 0.0 3.3 0.2	60.0 0.1 18.0 1.1	196.3 0.3 54.2 3.6	26.8
Single vehicle	Sideswipe crashes: Other multiple-vehic Total multiple-veh Crashes with anima Crashes with fixed of	cle crashes: icle crashes: l: object: object:	24.8 951.2 4.5 229.4	0.1 3.9 0.0 1.2	0.3 10.8 0.0 3.3 0.2	60.0 0.1 18.0	196.3 0.3 54.2	680.2 4.2 152.7
Single vehicle	Sideswipe crashes: Other multiple-vehic Total multiple-veh Crashes with anima Crashes with fixed of Crashes with other	cle crashes: icle crashes: il: object: object: d vehicle:	24.8 951.2 4.5 229.4 31.8	0.1 3.9 0.0 1.2 0.1	0.3 10.8 0.0 3.3 0.2 0.1	60.0 0.1 18.0 1.1	196.3 0.3 54.2 3.6	680.2 4.2 152.7 26.8
Single vehicle	Sideswipe crashes: Other multiple-vehic Total multiple-veh Crashes with anima Crashes with fixed of Crashes with other Crashes with parket	cle crashes: icle crashes: il: object: object: d vehicle: e crashes	24.8 951.2 4.5 229.4 31.8 4.5	0.1 3.9 0.0 1.2 0.1 0.0	0.3 10.8 0.0 3.3 0.2 0.1 1.0	60.0 0.1 18.0 1.1 0.3	196.3 0.3 54.2 3.6 1.0	680.2 4.2 152.7 26.8 3.0

	Evaluation Site Summary							
General In	formation							
Project des	cription:	I-270 From	MD 28 to MD 189_Ph	ase 1 Build				
Analyst:		DK	Date:	1/31/22		Area type:		Urban
First year o	f analysis:	2027	Total length of freeway		for Study F		0.970	
Last year o		2045		, 0	•	,		
Site Descr								
Freeway S								
Number	Lanes	Study Poriod	Study Period Descript	ion				
Nullibei	Lanes	-	Study Feriod Descripti	1011				
	10	Length (mi)	00110017 110010					
1	10	0.070	GP MP 6.47 - MP 6.40					
2	10	0.070	GP MP 6.40 - MP 6.33					
3	10	0.040	GP MP 6.33 - MP 6.29					
4	10	0.630	GP MP 6.29 - MP 5.66					
5	10	0.160	GP MP 5.66 - MP 5.50					
6	0	0.000	0					
7	0	0.000	0					
8	0	0.000	0					
9	0	0.000	0					
10	0	0.000	0					
11	0	0.000	0					
12	0	0.000	0					
13	0	0.000	0					
14	0	0.000	0					
15	0	0.000	0					
16	0	0.000	0					
17	0	0.000	0					
18	0	0.000	0					
19	0	0.000	0					
20	0	0.000	0					
Ramp Seg	ments	•				•		
	Study Perio	od		Number	Study Peri	iod		
	Description				Descriptio			
		om I-270 NB to		21	0	-		
		om MD 28 WE		22	0			
	-	om MD 28 EB		23	0			
		om I-270 NB to		24	0			
5				25	0			
		om I-270 NB to						
		om I-270 SB to		26	0			
7		om I-270 SB to		27	0			
8	-	om MD 28 EB		28	0			
9		om MD 28 WE		29	0			
	0			30	0			
	0			31	0			
	0			32	0			
13	0			33	0			
14	0			34	0			
	0			35	0			
	0			36	0			
	0			37	0			
	0			38	0			
19				39				
20	0 0			39 40	0			
		min - I-		40	U			
	Ramp Ter	Control	Study Daried Deceries	ion				
Number	Config.	Control	Study Period Descripti	ion				
1	D3ex	Signal	MD 28 at I-270 NB					
2	D3ex	Signal	MD 28 at I-270 SB					
3	0	0	0					
4	0	Ö	0					
5	0	0	0					
6	0	0	0					
J	J	J	٥					

		Out	tput Summa	ıry				
General Information	1			,				
Project description:	I-270 From N	/ID 28 to MD 189 Pha	ase 1 Build					
Analyst:	DK	Date:	1/31/22		Area type:	l	Jrban	
First year of analysis	: 2027				, ,,	I		
Last year of analysis								
Crash Data Descrip								
Freeway segments		sh data available?		No	First year of	f crash data		
rooway oogmonio		crash data available?	>	No	Last year of			
Ramp segments		sh data available?	•	No	First year of			
ramp segments		crash data available?	>	No	Last year of			
Ramp terminals		sh data available?	•	No	First year of			
rtamp terminais		crash data available?	>	No	Last year of			
Estimated Crash St		crasii data available :		140	Last year or	orasii data.		
Crashes for Entire I			Total	K	Α	В	С	PDO
						_	_	
Estimated number of crasl			1807.6	6.7	25.2	135.4	392.0	1248.2
Estimated average crash f			95.1	0.4		7.1	20.6	65.7
Crashes by Facility		Nbr. Sites	Total	K	Α	В	С	PDO
Freeway segments, o		5	1385.8	5.8		88.7	283.3	992.0
Ramp segments, cra		9	68.8	0.7	2.0	11.3	17.3	37.6
Crossroad ramp term	,		353.0	0.3		35.5	91.4	218.7
Crashes for Entire I	Facility by Yea	ar Year	Total	K	Α	В	С	PDO
Estimated number of	crashes during	g 2027	95.1	0.4		7.1	20.6	65.7
the Study Period, cra	shes:	2028	95.1	0.4		7.1	20.6	65.7
		2029	95.1	0.4	1.3	7.1	20.6	65.7
		2030	95.1	0.4	1.3	7.1	20.6	65.7
		2031	95.1	0.4	1.3	7.1	20.6	65.7
		2032	95.1	0.4	1.3	7.1	20.6	65.7
		2033	95.1	0.4	1.3	7.1	20.6	65.7
		2034	95.1	0.4	1.3	7.1	20.6	65.7
		2035	95.1	0.4	1.3	7.1	20.6	65.7
		2036	95.1	0.4	1.3	7.1	20.6	65.7
		2037	95.1	0.4		7.1	20.6	65.7
		2038	95.1	0.4		7.1	20.6	65.7
		2039	95.1	0.4	1.3	7.1	20.6	65.7
		2040	95.1	0.4	1.3	7.1	20.6	65.7
		2041	95.1	0.4		7.1	20.6	65.7
		2042	95.1	0.4	1.3	7.1	20.6	65.7
		2043	95.1	0.4	1.3	7.1	20.6	65.7
		2044	95.1	0.4	1.3	7.1	20.6	65.7
		2045	95.1	0.4	1.3	7.1	20.6	65.7
		2045	ا . ا	0.4	1.3	1.1	20.0	00.7
		2047					+	
		2047	 				+	
		2048				+	+	
		2049	 		1		+	
Distribution of Care	has for Entire							
Distribution of Cras	I EIIUFE	: Facility	Eatima	tad Numb	or of Crock	oe During 4	ho Study F	Poriod
Crash Type	Crash [*]	Type Category			er of Crash	es During t B	C C	
Multiple vel-t-t-	lland		Total	K	Α 0.0	_	_	PDO
Multiple vehicle	Head-on cras		7.1	0.0		1.0	2.8	3.1
	Right-angle		106.6	0.2	2.2	11.4	30.5	62.3
	Rear-end cra		978.1	3.6		75.6	225.0	659.8
	Sideswipe cr		307.2	0.8		14.3	44.1	245.4
		e-vehicle crashes:	35.1	0.2	0.5	2.7	8.0	23.8
		ple-vehicle crashes:	1434.1	4.9		104.9	310.4	994.3
·		animal·	5.1	0.0		0.1	0.3	4.7
Single vehicle		Crashes with animal: Crashes with fixed object:		4.0	4.0	21.8	58.1	186.2
Single vehicle	Crashes with	fixed object:	271.4	1.3	4.0			
Single vehicle	Crashes with		271.4 36.6	0.1	0.2	1.2	3.6	
Single vehicle	Crashes with Crashes with	fixed object:			0.2			31.4
Single vehicle	Crashes with Crashes with Crashes with	n fixed object: n other object: n parked vehicle:	36.6	0.1	0.2	1.2	3.6	31.4 4.1
Single vehicle	Crashes with Crashes with Crashes with Other single-	n fixed object: n other object:	36.6 5.9	0.1	0.2 0.1 1.3	1.2 0.4	3.6 1.2	31.4

	Evaluation Site Summary								
General In	formation								
Project des	scription:	I-270 From	MD 189 to W	ootton P	arkway Ph	ase 1 Build			
Analyst:	•	DK		ate:	1/31/22		Area type:		Urban
First year o	of analysis:	2027	Total length o	f freewa	v segments	for Study F	Period (mi):	0.600	
Last year o		2045	J		, 0	,	, ,		
Site Descr									
Freeway S									
Number	Lanes	Study Period	Study Period	Descript	ion				
		Length (mi)	,						
1	10	0.130	GP MP 5.50 - MF	5.37					
2	10	0.160	GP MP 5.37 - MF						
3	10	0.310	GP MP 5.21 - MF						
4	0	0.000	0						
5	0	0.000	0						
6	0	0.000	0						
7	0	0.000	0						
8	0	0.000	0						
9	0	0.000	0						
10	0	0.000	0						
11	0	0.000	0						
12	0	0.000	0						
13	0	0.000							
13	0	0.000	0 0						
15	0	0.000							
16	0	0.000	0 0						
17	0	0.000	0						
18	0	0.000	0						
19	0	0.000	0						
20	0	0.000	0						
Ramp Seg		0.000	0						
	Study Perio	od			Number	Study Peri	od		
	Description				Number	Description			
		om I-270 NB t			21	0	•		
		om MD 189 W			22	0			
		om MD 189 W			23	0			
		om MD 189 to			24	0			
		om I-270 SB to			25	0			
		om I-270 SB to			26	0			
7	-	om I-270 SB to			27	0			
8	-	om MD 189 El			28	0			
9	-	om MD 189 to			29	0			
		from MD 189 E			30	0			
	-	from I-270 NB			31	0			
		from I-270 NB			32	0			
	0				33	0			
	0				34	0			
	0				35	0			
	0				36	0			
	0				37	0			
	0				38	0			
	0				39	0			
20	0				40	0			
	l Ramp Ter	rminals							
Number	Config.		Study Period	Descript	ion				
1	0	0	0						
2	0	0	0						
3	0	0	0						
4	0	0	0						
5	0	0	0						
6	0	0	0						

			Out	tput Summa	arv				
General Information)				,				
Project description:	I-270 From	MD 189 to	Wootton Pa	arkwav Pha	se 1 Build				
Analyst:	DK			1/31/22		Area type:		Urban	
First year of analysis	2027		<u> </u>			, ,,	I		
Last year of analysis									
Crash Data Descrip									
Freeway segments	Segment cr	rash data a	vailable?		No	First year o	f crash data	·	
rooway oogmonio			ta available?	,	No		f crash data		
Ramp segments	Segment cr			•	No		f crash data		
ramp segments			ta available?	,	No		f crash data		
Ramp terminals	Segment cr				No		f crash data		
ramp terminais			ta available?	,	No		f crash data		
Estimated Crash St	_	or crasir da	ia avallabic :		110	Last year o	i ciasii data		
Crashes for Entire I				Total	K	Α	В	С	PDO
								_	
Estimated number of crasl				981.0	4.1	11.3	62.0	205.0	698.6
Estimated average crash f				51.6	0.2		3.3	10.8	36.8
Crashes by Facility			Nbr. Sites	Total	K	Α	В	С	PDO
Freeway segments, o			3	936.7	3.6		56.0	194.8	672.2
Ramp segments, cra			12	44.3	0.4		6.1	10.3	26.3
Crossroad ramp term			0	0.0	0.0		0.0	0.0	0.0
Crashes for Entire I	acility by Ye	ear	Year	Total	K	Α	В	С	PDO
Estimated number of	crashes duri	ng	2027	51.6	0.2	0.6	3.3	10.8	36.8
the Study Period, cra	shes:		2028	51.6	0.2	0.6	3.3	10.8	36.8
			2029	51.6	0.2	0.6	3.3	10.8	36.8
			2030	51.6	0.2	0.6	3.3	10.8	36.8
			2031	51.6	0.2	0.6	3.3	10.8	36.8
			2032	51.6	0.2	0.6	3.3	10.8	36.8
			2033	51.6	0.2	0.6	3.3	10.8	36.8
			2034	51.6	0.2	0.6	3.3	10.8	36.8
			2035	51.6	0.2	0.6	3.3	10.8	36.8
			2036	51.6	0.2	0.6	3.3	10.8	36.8
			2037	51.6	0.2	0.6	3.3	10.8	36.8
			2038	51.6	0.2	0.6	3.3	10.8	36.8
			2039	51.6	0.2	0.6	3.3	10.8	36.8
			2040	51.6	0.2	0.6	3.3	10.8	36.8
			2041	51.6	0.2	0.6	3.3	10.8	36.8
			2042	51.6	0.2	0.6	3.3	10.8	36.8
			2043	51.6	0.2	0.6	3.3	10.8	36.8
			2044	51.6	0.2	0.6	3.3	10.8	36.8
			2044	51.6	0.2	0.6	3.3	10.8	36.8
			2045	31.0	0.2	0.0	5.5	10.0	30.0
			2040						
			2047						
			2046						
			2049						
Distribution of Care	has for Enti-	ro Eggilit.	2000						
Distribution of Cras	iles IUI EIIIII	e raciiity	1	Estima	tod Numb	or of Crock	oe During (the Study F	Pariod
Crash Type	Crash	Type Cat	egory			er of Crash	B Buring	C C	
Multiple vel-t-t-	lleed			Total	<u>K</u>	A 0.4		_	PDO
Multiple vehicle	Head-on cr			2.7	0.0		0.3	1.2	1.1
	Right-angle			15.9	0.1		1.3	4.5	9.9
	Rear-end crashes:			537.6	2.2		33.7	116.0	379.7
		Sideswipe crashes:		185.5	0.5		8.2	28.3	147.1
	Sideswipe of	crashes:			_		4 4	4.7	
	Sideswipe of Other multiple	crashes: ple-vehicle		19.8	0.1	0.3	1.4		
	Sideswipe of Other multiple Total multiple	crashes: ple-vehicle tiple-vehicl		19.8 761.6	2.9	8.1	44.9	154.6	551.1
Single vehicle	Sideswipe of Other multing Total multing Crashes wi	crashes: ple-vehicle tiple-vehicl th animal:	e crashes:	19.8 761.6 3.0	2.9 0.0	8.1 0.0	44.9 0.0	154.6 0.1	551.1 2.8
Single vehicle	Sideswipe of Other multing Total multing Crashes wing Crashes wing Crashes wing Sideswipe of Sid	crashes: ple-vehicle tiple-vehicl th animal: th fixed obj	e crashes: ect:	19.8 761.6 3.0 159.9	2.9	8.1 0.0	44.9	154.6	551.1 2.8
Single vehicle	Sideswipe of Other multing Total multing Crashes wi	crashes: ple-vehicle tiple-vehicl th animal: th fixed obj	e crashes: ect:	19.8 761.6 3.0	2.9 0.0	8.1 0.0 2.3	44.9 0.0	154.6 0.1	551.1 2.8 108.3
Single vehicle	Sideswipe of Other multing Total multing Crashes wing Crashes wing Crashes wing Sideswipe of Sid	crashes: ple-vehicle tiple-vehicl th animal: th fixed obj th other ob	e crashes: ect: ject:	19.8 761.6 3.0 159.9	2.9 0.0 0.8	8.1 0.0 2.3 0.1	44.9 0.0 12.3	154.6 0.1 36.2	551.1 2.8 108.3 18.8
Single vehicle	Other multi Total mul Crashes wi Crashes wi Crashes wi Crashes wi	crashes: ple-vehicle tiple-vehicl th animal: th fixed obj th other ob th parked v	e crashes: ect: ject: rehicle:	19.8 761.6 3.0 159.9 22.2	2.9 0.0 0.8 0.0	8.1 0.0 2.3 0.1 0.0	44.9 0.0 12.3 0.7	154.6 0.1 36.2 2.4	551.1 2.8 108.3 18.8 2.1
Single vehicle	Other multi Total mul Crashes wi Crashes wi Crashes wi Crashes wi Other single	crashes: ple-vehicle tiple-vehicl th animal: th fixed obj th other ob th parked v	e crashes: ect: ject: rehicle: rashes	19.8 761.6 3.0 159.9 22.2 3.0	2.9 0.0 0.8 0.0 0.0	8.1 0.0 2.3 0.1 0.0 0.7	44.9 0.0 12.3 0.7 0.2	154.6 0.1 36.2 2.4 0.7	13.3 551.1 2.8 108.3 18.8 2.1 15.5 147.5

	Evaluation Site Summary							
General In	formation				,			
Project des		I-270 From	Wootton Pkwy to Mon	trose Rd F	hase 1 Buil	ld		
Analyst:		NK		1/31/22		Area type:	Ur	ban
First year o	f analysis:	2027	Total length of freeway	segments	for Study F	Period (mi):	0.770	
Last year o		2045		, 0	,	, ,		
Site Descr								
Freeway S								
Number	Lanes	Study Period	Study Period Descript	ion				
		Length (mi)						
1	10		GP MP 4.95 - MP 4.44					
2	10	0.040	GP MP 4.44 - MP 4.40					
3	10	0.120	GP MP 4.40 - MP 4.28					
4	10	0.060	GP MP 4.28 - MP 4.22					
5	10	0.040	GP MP 4.22 - MP 4.18					
6	0	0.000	0					
7	0		0					
8	0	0.000	0					
9	0	0.000	0					
10	0	0.000	0					
11	0	0.000	0					
12	0	0.000	0					
13	0	0.000	0					
14	0	0.000	0					
15	0	0.000	0					
16	0	0.000	0					
17	0	0.000	0					
18	0	0.000	0					
19	0	0.000	0					
20	0	0.000	0					
Ramp Seg		0.000	Į°			L		
	Study Perio	nd		Number	Study Peri	od		
	Description			Hambon	Description			
		from I-270 SB		21	0	•		
		from I-270 SB		22	0			
	MT2-1 Ramp			23	0			
	MT3-1 Ramp			24	0			
	-	from I-270 NB		25	0			
	-	from I-270 NB		26	0			
	0			27	0			
	0			28	0			
	0			29	0			
	0			30	0			
	0			31	0			
	0			32	0			
	0			33	0			
	0			34	0			
	0			35	0			
	0			36	0			
17	0			37	0			
	0			38	0			
	0			39	0			
	0			40	0			
	Ramp Ter	rminals	•		•			
Number	Config.		Study Period Descripti	ion				
1	0	0	0					
2	0	0	0					
3	0	0	0					
4	0	0	0					
5	0	0	0					
6	0	0	0					

		Out	put Summa	ary				
General Information								
Project description:	I-270 From Wootton	n Pkwy to Mont	trose Rd_Pr	nase 1 Buil	d			
Analyst:	NK	Date:	1/31/22		Area type:	U	Jrban	
First year of analysis:	2027							
Last year of analysis:	2045							
Crash Data Descript	ion							
Freeway segments	Segment crash data	a available?		No	First vear o	f crash data	:	
		roject-level crash data available?			•	f crash data		
Ramp segments	Segment crash data			No No		f crash data		
rtamp segments	Project-level crash)	No	•	f crash data		
Ramp terminals	Segment crash data			No	,	f crash data		
Italiip tellilliais	Project-level crash		,	No		f crash data		
F-4:	,	uata avallable !		NO	Last year o	i Crasii uata		
Estimated Crash Sta								
Crashes for Entire F	•		Total	K	Α	В	С	PDO
Estimated number of crash	• •		949.0	4.0	11.2	61.6	213.4	658.9
Estimated average crash from	eq. during Study Period, o	rashes/yr:	49.9	0.2	0.6	3.2	11.2	34.7
Crashes by Facility	Component	Nbr. Sites	Total	K	Α	В	С	PDO
Freeway segments, c	rashes:	5	912.6	3.7	10.2	56.7	204.2	637.7
, , ,	lamp segments, crashes:			0.3	1.0	4.9	9.1	21.2
Crossroad ramp termi		6	36.5 0.0	0.0	0.0	0.0	0.0	0.0
Crashes for Entire F		Year	Total	K	Α	В	C 0.0	PDO
Estimated number of		2027	49.9	0.2	0.6	3.2	11.2	34.7
the Study Period, cras		2027	49.9	0.2	0.6	3.2	11.2	34.7
ule Study Period, Cras	o⊓⊂5.							
		2029	49.9	0.2	0.6	3.2	11.2	34.7
		2030	49.9	0.2	0.6	3.2	11.2	34.7
		2031	49.9	0.2	0.6	3.2	11.2	34.7
		2032	49.9	0.2	0.6	3.2	11.2	34.7
		2033	49.9	0.2	0.6	3.2	11.2	34.7
		2034	49.9	0.2	0.6	3.2	11.2	34.7
		2035	49.9	0.2	0.6	3.2	11.2	34.7
		2036	49.9	0.2	0.6	3.2	11.2	34.7
		2037	49.9	0.2	0.6	3.2	11.2	34.7
		2038	49.9	0.2	0.6	3.2	11.2	34.7
		2039	49.9	0.2	0.6	3.2	11.2	34.7
		2040	49.9	0.2	0.6	3.2	11.2	34.7
		2041	49.9	0.2	0.6	3.2	11.2	34.7
		2042	49.9	0.2	0.6	3.2	11.2	34.7
		2043	49.9	0.2	0.6	3.2	11.2	34.7
		2044	49.9	0.2	0.6	3.2	11.2	34.7
		2045	49.9	0.2	0.6	3.2	11.2	34.7
		2046						
		2047						
		2048						
		2049						
		2050						
Distribution of Crasi	hes for Entire Facili	ity						
Crack Tune	Crock Type C	atogony	Estima	ted Numb	er of Crash	es During t	he Study F	Period
Crash Type	Crash Type C	alegory	Total	K	Α	В	С	PDO
Multiple vehicle	Head-on crashes:		2.7	0.0	0.1	0.3	1.2	1.1
•	Right-angle crashes	s:	15.3	0.1	0.2	1.2	4.4	9.4
	Rear-end crashes:		517.0	2.1	5.8	32.2	115.1	361.9
	Sideswipe crashes:		176.4	0.5	1.4	7.9	28.2	138.5
	Other multiple-vehic		18.8	0.3	0.2	1.3	4.6	12.5
Cinala valaiala	Total multiple-veh		730.1	2.8	7.7	42.9	153.4	523.3
Single vehicle	Crashes with anima		2.9	0.0	0.0	0.1	0.2	2.6
	Crashes with fixed		159.6	0.9	2.5	13.4	43.1	99.7
	_		04.0	0.1	0.2	0.8	2.9	17.2
	Crashes with other		21.2					
	Crashes with parke	d vehicle:	2.9	0.0	0.0	0.2	0.8	1.8
		d vehicle:					0.8 12.9	
	Crashes with parke	d vehicle: e crashes le crashes:	2.9	0.0	0.0	0.2	0.8	1.8

Evaluation Site Summary									
General In	formation								
Project des		I-270 From	Montrose R	d to I-270	Y Phase 1	Build			
Analyst:		NK			1/31/22	•	Area type:		Urban
First year o		2027	Total length			for Study P		1.580	
Last year o		2045	. o.a. longar	J. HOOWA	, ວວອກາວກາວ	.o. olday i	51154 (1111 <i>)</i> .	1.000	•
Site Descr		2040							
Freeway S		04	Otuck D	d Deserie (ion				
Number	Lanes		Study Perio	u Descripti	IOU]		
	4.0	Length (mi)							
1	10	0.030	GP MP 4.18 - I						
2	10	0.040	GP MP 4.15 - I						
3	10	0.110	GP MP 4.11 - I	MP 4.00					
4	10	0.040	GP MP 4.00 - I	MP 3.96					
5	10	1.070	GP MP 3.96 - I	MP 2.89					
6	10	0.020	GP MP 2.89 - I	MP 2.87]		
7	10	0.220	GP MP 2.87 - I						
8	6	0.050	GP MP 2.65 - I						
9	0	0.000	0]		
10	0	0.000	0						
11	0	0.000	0						
12									
	0	0.000	0]		
13	0	0.000	0						
14	0	0.000	0]		
15	0	0.000	0]		
16	0	0.000	0						
17	0	0.000	0]		
18	0	0.000	0]		
19	0	0.000	0]		
20	0	0.000	0				<u> </u>		
Ramp Seg									
	Study Perio	od			Number	Study Peri	od		
	Description					Description			
1	•	om I-270 NB to			21	0			
2		om Tower Oal			22	0			
3		om Montrose I			23	0			
4	-	om Montrose I			24	0			
	-	om I-270 NB to			25	0			
6	-	om I-270 Sb to			26	0			
7	-	om Montrose I			27	0			
8		om Montrose I			28	0			
9	-	om Montrose I			29	0			
10	-	om Montrose i om Montrose i			30	0			
					31				
11	-	om Montrose I				0			
12	-	om I-270 SB to			32	0			
13	-	om I-270 SB to			33	0			
14	-	om I-270 SB to			34	0			
15	C10-1 Ramp	from I-270 NB			35	0			
16	C10-2 Ramp	from I-270 NB			36	0			
17	0				37	0			
18	0				38	0			
	0				39	0			
20	0				40	0			
	Ramp Ter	minals			•	•			
Number	Config.		Study Perio	d Descripti	ion				
1	B2	Signal	I-270 NB at To	wer Oaks Blv	rd/Geico Entra	nce			
2	0	Ö	0]		
3	0	0	0]		
4	0	Ö	0]		
5	0	0	0						
6	0	0	0						
·	v	, i	-				i .		

		Out	tput Summa	ary				
General Information			.,	<i>y</i>				
Project description:	I-270 From Montrose	e Rd to I-270 `	Y Phase 1 I	Build				
Analyst:	NK		1/31/22		Area type:	l	Jrban	
First year of analysis:	2027				, ,,	I		
Last year of analysis:								
Crash Data Descript								
Freeway segments	Segment crash data	available?		No	First vear o	f crash data	: 1	
	Project-level crash d		>	No	,	f crash data:		
Ramp segments	Segment crash data			No	,	f crash data		
ramp oogmone	Project-level crash d		>	No	•	f crash data:		
Ramp terminals	Segment crash data			No		f crash data		
tamp tommalo	Project-level crash d		?	No		f crash data:		
Estimated Crash Sta					,			
Crashes for Entire F			Total	K	Α	В	С	PDO
	es during Study Period, cra	ishes.	2095.3	8.1	24.5	135.0	465.4	1462.3
	req. during Study Period, cra		110.3	0.4		7.1	24.5	77.0
Crashes by Facility		Nbr. Sites	Total	K	Α	В	C C	PDO
Freeway segments, c		NDI. Sites	1870.4	7.3		112.8	406.3	1323.8
Ramp segments, cras		16	76.5	0.8		112.6	17.4	44.4
Crossroad ramp term		10	148.4	0.8		10.7	41.8	94.1
Crashes for Entire F	,	Year	Total	K	A 1.7	B	C C	PDO
Estimated number of		2027	110.3	0.4		7.1	24.5	77.0
the Study Period, cra		2027	110.3	0.4		7.1	24.5	77.0
ine Study Feriou, Gras	31103.	2029	110.3	0.4		7.1	24.5	77.0
		2029	110.3	0.4	1.3	7.1	24.5	77.0 77.0
		2030	110.3	0.4	1.3	7.1	24.5	77.0
		2032	110.3	0.4	1.3	7.1	24.5	77.0
		2032	110.3	0.4	1.3	7.1	24.5	77.0
		2034	110.3	0.4		7.1	24.5	77.0
		2035	110.3	0.4	1.3	7.1	24.5	77.0
		2036	110.3	0.4	1.3	7.1	24.5	77.0
		2037	110.3	0.4		7.1	24.5	77.0
		2038	110.3	0.4		7.1	24.5	77.0
		2039	110.3	0.4	1.3	7.1	24.5	77.0
		2040	110.3	0.4	1.3	7.1	24.5	77.0
		2040	110.3	0.4		7.1	24.5	77.0
		2041	110.3	0.4	1.3	7.1	24.5	77.0
		2042	110.3	0.4	1.3	7.1	24.5	77.0
		2043	110.3	0.4	1.3	7.1	24.5	77.0
		2044	110.3	0.4	1.3	7.1	24.5	77.0
		2045	110.3	0.4	1.3	1.1	24.3	11.0
		2040				+		
		2047						
		2049				+		
		2050						
Distribution of Cras	hes for Entire Facilit				<u>ı</u>			
			Fstima	ited Numb	er of Crash	es Durina t	he Study F	Period
Crash Type	Crash Type Ca	ategory	Total	K	A	B	C	PDO
Multiple vehicle	Head-on crashes:		6.7	0.0		0.8	2.9	2.9
manupio voinoio	Right-angle crashes		66.4	0.0	0.1	5.3	20.0	40.0
	Rear-end crashes:	-	1139.0	4.2	12.6	70.9	255.4	795.9
	Sideswipe crashes:		378.1	1.0		15.9	57.2	301.1
	Other multiple-vehic	le crashes:	41.6	0.2	0.5	2.9	9.9	28.2
	Total multiple-vehi		1631.9	5.6		95.8	345.4	1168.0
Single vehicle	Crashes with animal		6.3	0.0		0.1	0.4	5.7
onigie veriloie	Crashes with fixed o		337.5	1.8		28.1	86.3	215.9
	Crashes with other of	•	44.4	0.1	0.3	1.7	5.7	36.6
	Crashes with parked		6.8	0.0		0.5	1.7	4.4
	Other single-vehicle		68.4	0.6		8.7	26.0	31.6
	Total single-vehicle		463.4	2.6		39.2	120.1	294.2
	Total single-venicion		2095.3	2.0 8.1		135.0	465.4	1462.3
	าบเลเ เกล	JI 103.	2090.3	0.1	24.3	100.0	400.4	1402.3

	Evaluation Site Summary							
General In	formation							
Project des		I-270 From	I-270 Y to Rockledge	Blvd Phase	e 1 Build			
Analyst:		NK		1/31/22		Area type:	Urban	
First year o		2027	Total length of freeway		for Study F	Period (mi):	0.730	
Last year o		2045	j ,		,	, ,		
Site Descr								
Freeway S								
Number	Lanes	Study Period	Study Period Descripti	on				
		Length (mi)	'					
1	6		GP MP 2.60 - MP 2.14					
2	5	0.090	GP MP 2.14 - MP 2.05					
3	4	0.180	GP MP 2.05 - MP 1.87					
4	0	0.000	0					
5	0		0					
6	0	0.000	0					
7	0	0.000	0					
8	0	0.000	0					
9	0	0.000	0					
10	0	0.000	0					
11	0	0.000	0					
12	0	0.000	0					
13	0	0.000	0					
14	0	0.000	0					
15	0	0.000	0					
16	0	0.000	0					
17	0	0.000	0					
18	0	0.000	0					
19	0	0.000	0					
20	0	0.000	0					
Ramp Seg	ments		L			· ·		
	Study Perio	od		Number	Study Peri	od		
	Description				Description			
	0			21	0			
2	0			22	0			
3	0			23	0			
	0			24	0			
	0			25	0			
	0			26	0			
	0			27	0			
	0			28	0			
	0			29	0			
	0			30	0			
	0			31	0			
	0			32	0			
_	0			33	0			
	0			34	0			
	0			35	0			
	0			36	0			
	0			37	0			
_	0			38	0			
	0			39	0			
_	0			40	0			
Number	Ramp Ter Config.		Study Period Descripti	on				
1	0	0	0					
2	0	0	0					
3	0	0	0					
4	0	0	0					
5	0	0	0					
6	0	0	0					
Ĭ	v		Į -			1		

		Out	tput Summa	ary				
General Information								
Project description:	I-270 From I-270 Y t	o Rockledge I	Blvd_Phase	1 Build				
Analyst:	NK	Date:	1/31/22		Area type: Urban			
First year of analysis:	2027					•		
Last year of analysis:	2045							
Crash Data Descript								
Freeway segments	Segment crash data	available?		No	First year o	f crash data		
l reeway segments	Project-level crash of		>	No	•	f crash data		
Domn cogmonto	Segment crash data			No		f crash data		
Ramp segments			,					
D	Project-level crash o		?	No		f crash data		
Ramp terminals	Segment crash data			No		f crash data		
	Project-level crash of	lata available'	?	No	Last year o	f crash data		
Estimated Crash Sta								
Crashes for Entire F	acility		Total	K	Α	В	С	PDO
Estimated number of crash	es during Study Period, cra	ashes:	415.9	1.8	5.1	28.2	88.4	292.4
Estimated average crash fr	eq. during Study Period, cr	ashes/yr:	21.9	0.1	0.3	1.5	4.7	15.4
Crashes by Facility		Nbr. Sites	Total	K	Α	В	С	PDO
Freeway segments, o		3	415.9	1.8		28.2	88.4	292.4
Ramp segments, cras		0	0.0	0.0	0.0	0.0	0.0	0.0
Crossroad ramp term		0	0.0	0.0	0.0	0.0	0.0	0.0
	•	- v						
Crashes for Entire F		Year	Total	K	A	В	С	PDO
Estimated number of		2027	21.9	0.1	0.3	1.5	4.7	15.4
the Study Period, cra	shes:	2028	21.9	0.1	0.3	1.5	4.7	15.4
		2029	21.9	0.1	0.3	1.5	4.7	15.4
		2030	21.9	0.1	0.3	1.5	4.7	15.4
		2031	21.9	0.1	0.3	1.5	4.7	15.4
		2032	21.9	0.1	0.3	1.5	4.7	15.4
		2033	21.9	0.1	0.3	1.5	4.7	15.4
		2034	21.9	0.1	0.3	1.5	4.7	15.4
		2035	21.9	0.1	0.3	1.5	4.7	15.4
		2036	21.9	0.1	0.3	1.5	4.7	15.4
		2037	21.9	0.1	0.3	1.5	4.7	15.4
		2038	21.9	0.1	0.3	1.5	4.7	15.4
		2039	21.9	0.1	0.3	1.5	4.7	15.4
		2040	21.9	0.1	0.3	1.5	4.7	15.4
		2041	21.9	0.1	0.3	1.5	4.7	15.4
		2042	21.9	0.1	0.3	1.5	4.7	15.4
		2043	21.9	0.1	0.3	1.5	4.7	15.4
		2044	21.9	0.1	0.3	1.5	4.7	15.4
		2045	21.9	0.1	0.3	1.5	4.7	15.4
		2045	21.3	0.1	0.5	1.5	7.7	10.4
		2047						
		2048				+		
		2049						
		2050				L		
Distribution of Cras	baa fau Futius Faailit	'y						
	nes for Entire Facilit					an During t	ha Study E	Period
				ted Numb				
Crash Type	Crash Type C		Estima Total	ited Numb K	er of Crash A	B B	C	PDO
Crash Type	Crash Type C	ategory	Total	K	A 0.0	В	С	PDO
Crash Type	Crash Type C	ategory	Total 1.1 6.4	K	A 0.0	B 0.2 0.6	C 0.5	PDO 0.4
Crash Type	Crash Type Control Head-on crashes: Right-angle crashes: Rear-end crashes:	ategory	Total 1.1 6.4 217.2	0.0 0.0 1.0	0.0 0.1 2.8	0.2 0.6 15.7	0.5 1.9 49.1	9DO 0.4 3.8 148.6
Crash Type	Crash Type Control Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes:	ategory	Total 1.1 6.4 217.2 72.6	0.0 0.0 1.0 0.3	0.0 0.1 2.8 0.7	0.2 0.6 15.7 3.9	0.5 1.9 49.1 12.1	9DO 0.4 3.8 148.6 55.7
Crash Type	Crash Type Control Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehice	ategory:	Total 1.1 6.4 217.2 72.6 7.6	0.0 0.0 1.0 0.3 0.0	0.0 0.1 2.8 0.7 0.1	B 0.2 0.6 15.7 3.9 0.6	0.5 1.9 49.1 12.1 1.9	9DO 0.4 3.8 148.6 55.7 4.9
Crash Type Multiple vehicle	Crash Type Control Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehic	ategory : : : : : : : : : : : : : : : : : : :	Total 1.1 6.4 217.2 72.6 7.6 305.0	0.0 0.0 1.0 0.3 0.0 1.4	0.0 0.1 2.8 0.7 0.1 3.8	B 0.2 0.6 15.7 3.9 0.6 20.9	0.5 1.9 49.1 12.1 1.9 65.5	9DO 0.4 3.8 148.6 55.7 4.9 213.5
Crash Type Multiple vehicle	Crash Type Company Crash Type Company Crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehic Total multiple-vehic Crashes with animal	ategory : : : : : : : : : : : : : : : : : : :	Total 1.1 6.4 217.2 72.6 7.6 305.0 1.8	0.0 0.0 1.0 0.3 0.0 1.4	0.0 0.1 2.8 0.7 0.1 3.8 0.0	8 0.2 0.6 15.7 3.9 0.6 20.9	0.5 1.9 49.1 12.1 1.9 65.5 0.1	9DO 0.4 3.8 148.6 55.7 4.9 213.5
Crash Type	Crash Type Company Crash Type Company Crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehic Total multiple-vehic Crashes with animal Crashes with fixed company Crashes	le crashes: icle crashes: l:	Total 1.1 6.4 217.2 72.6 7.6 305.0 1.8 80.0	0.0 0.0 1.0 0.3 0.0 1.4 0.0 0.3	0.0 0.1 2.8 0.7 0.1 3.8 0.0 0.9	B 0.2 0.6 15.7 3.9 0.6 20.9 0.0 5.2	0.5 1.9 49.1 12.1 1.9 65.5 0.1	9DO 0.4 3.8 148.6 55.7 4.9 213.5 1.7 57.0
Crash Type Multiple vehicle	Crash Type Control Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehic Total multiple-vehic Crashes with animal Crashes with fixed control crashes with other crashes with other	le crashes: icle crashes: l: bbject: bbject:	Total 1.1 6.4 217.2 72.6 7.6 305.0 1.8 80.0 12.8	0.0 0.0 1.0 0.3 0.0 1.4 0.0 0.3 0.0	0.0 0.1 2.8 0.7 0.1 3.8 0.0 0.9	B 0.2 0.6 15.7 3.9 0.6 20.9 0.0 5.2 0.4	0.5 1.9 49.1 12.1 1.9 65.5 0.1 16.5	9DO 0.4 3.8 148.6 55.7 4.9 213.5 1.7 57.0
Crash Type Multiple vehicle	Crash Type Company Crash Type Company Crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehic Total multiple-vehic Crashes with animal Crashes with fixed company Crashes	le crashes: icle crashes: l: bbject: bbject:	Total 1.1 6.4 217.2 72.6 7.6 305.0 1.8 80.0	0.0 0.0 1.0 0.3 0.0 1.4 0.0	0.0 0.1 2.8 0.7 0.1 3.8 0.0 0.9	B 0.2 0.6 15.7 3.9 0.6 20.9 0.0 5.2	0.5 1.9 49.1 12.1 1.9 65.5 0.1	9DO 0.4 3.8 148.6 55.7 4.9 213.5 1.7 57.0
Crash Type Multiple vehicle	Crash Type Content of the content of	de crashes: icle crashes: icle crashes: icle crashes: icle crashes: icle crashes: icle crashes: icle crashes: icle crashes: icle crashes: icle crashes: icle crashes: icle crashes: icle crashes: icle crashes: icle crashes:	Total 1.1 6.4 217.2 72.6 7.6 305.0 1.8 80.0 12.8	0.0 0.0 1.0 0.3 0.0 1.4 0.0 0.3 0.0	0.0 0.1 2.8 0.7 0.1 3.8 0.0 0.9	B 0.2 0.6 15.7 3.9 0.6 20.9 0.0 5.2 0.4	0.5 1.9 49.1 12.1 1.9 65.5 0.1 16.5	9DO 0.4 3.8 148.6 55.7 4.9 213.5 1.7 57.0
Crash Type Multiple vehicle	Crash Type Control Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehic Total multiple-vehic Crashes with animal Crashes with fixed control crashes with other crashes with other	le crashes: icle crashes: icle crashes: icle crashes: icle crashes: icle crashes: icle crashes: icle crashes	7otal 1.1 6.4 217.2 72.6 7.6 305.0 1.8 80.0 12.8 1.5	0.0 0.0 1.0 0.3 0.0 1.4 0.0 0.3 0.0	0.0 0.1 2.8 0.7 0.1 3.8 0.0 0.9 0.1	B 0.2 0.6 15.7 3.9 0.6 20.9 0.0 5.2 0.4 0.1	0.5 1.9 49.1 12.1 1.9 65.5 0.1 16.5 1.3	9DO 0.4 3.8 148.6 55.7 4.9 213.5 1.7 57.0 11.0

	Evaluation Site Summary							
General In	formation		Lvaiua	tion Site S	ullillal y			
Project des		I-270 From	Rockledge Blvd to MD	187				
Analyst:	оприон.	NK	Date:	1/31/22		Area type:	Urban	
First year c	of analysis.	2027	Total length of freeway		for Study F		0.290	
Last year o		2045	Total longin of hoowa	y oogmonio	Tor Olday I	criod (IIII).	0.200	
Site Descr		2040						
Freeway S								
Number	Lanes	Study Period	Study Period Descripti	ion				
Number	Lancs	Length (mi)	Olddy'r enod Descripti	1011				
1	4		GP MP 1.87 - MP 1.69					
2	4	0.010	GP MP 1.69 - MP 1.68					
3	4	0.100	GP MP 1.68 - MP 1.58					
4	0	0.000	0					
5	0	0.000	0					
6	0	0.000						
7	0		0					
		0.000	0					
8	0	0.000	0					
9	0	0.000	0					
10	0	0.000	0					
11	0	0.000	0					
12	0	0.000	0					
13	0	0.000	0					
14	0	0.000	0					
15 16	0	0.000	0					
16	0	0.000	0					
17 18	0	0.000	0					
18	0 0	0.000	0					
20	0	0.000 0.000	0					
Ramp Seg		0.000	U					
	Study Perio	od		Number	Study Peri	od		
Number	Description			Nullibel	Description			
1		om I-270SB to		21	0	''		
2		om Rockledge		22	0			
3		om I-270 NB t		23	0			
4		om Rockledge		24	0			
5	0			25	0			
6	0			26	0			
7	0			27	0			
8	0			28	0			
9	0			29	0			
10	0			30	0			
11	0			31	0			
12	0			32	0			
13	0			33	0			
14	0			34	0			
15	0			35	0			
16	0			36	0			
17	0			37	0			
18	0			38	0			
19	0			39	0			
20	0			40	0			
	l Ramp Ter	rminals						
Number	Config.	Control	Study Period Descripti	ion				
1	D4	Signal	Rockledge Blvd at I-270 NB					
2	D4	_	Rockledge Blvd at I-270 SB					
3	0	0	0					
4	0	0	0					
5	0	0	0					
6	0	0	0					
-	_		[-					

		Out	put Summa	ırv				
General Information	1			,				
Project description:		ockledge Blvd to MD	187					
Analyst:	NK		1/31/22		Area type:	Ti	Jrban	
First year of analysis:		Daio.	., ., .,		₁			
Last year of analysis:								
Crash Data Descrip								
		h data available?	T	No	First veer o	f araah data	. 1	
Freeway segments		h data available?	,			f crash data		
		rash data available?	·	No		f crash data		
Ramp segments		h data available?		No	•	f crash data		
		rash data available?	?	No		f crash data		
Ramp terminals		h data available?		No		f crash data		
	Project-level of	rash data available?	?	No	Last year of	f crash data:	:	
Estimated Crash Sta	atistics							
Crashes for Entire F	acility		Total	K	Α	В	С	PDO
Estimated number of crash	nes durina Study Pe	riod, crashes:	643.2	1.4	7.5	41.4	163.2	429.7
Estimated average crash fi			33.9	0.1		2.2	8.6	22.6
Crashes by Facility		Nbr. Sites	Total	K	Α	В	С	PDO
Freeway segments, o		3	176.3	0.7		11.5	39.0	123.1
Ramp segments, cra		4	57.8	0.7		6.5	16.4	32.8
Crossroad ramp term		2	409.2	0.5		23.5	107.8	273.8
		_						
Crashes for Entire F			Total	K	Α	В	С	PDO
Estimated number of	U	2027	33.9	0.1		2.2	8.6	22.6
the Study Period, cra	shes:	2028	33.9	0.1	0.4	2.2	8.6	22.6
		2029	33.9	0.1	0.4	2.2	8.6	22.6
		2030	33.9	0.1	0.4	2.2	8.6	22.6
		2031	33.9	0.1	0.4	2.2	8.6	22.6
		2032	33.9	0.1	0.4	2.2	8.6	22.6
		2033	33.9	0.1	0.4	2.2	8.6	22.6
		2034	33.9	0.1	0.4	2.2	8.6	22.6
		2035	33.9	0.1	0.4	2.2	8.6	22.6
		2036	33.9	0.1	0.4	2.2	8.6	22.6
		2030						
			33.9	0.1	0.4	2.2	8.6	22.6
		2038	33.9	0.1	0.4	2.2	8.6	22.6
		2039	33.9	0.1	0.4	2.2	8.6	22.6
		2040	33.9	0.1	0.4	2.2	8.6	22.6
		2041	33.9	0.1	0.4	2.2	8.6	22.6
		2042	33.9	0.1	0.4	2.2	8.6	22.6
		2043	33.9	0.1	0.4	2.2	8.6	22.6
		2044	33.9	0.1	0.4	2.2	8.6	22.6
		2045	33.9	0.1	0.4	2.2	8.6	22.6
		2046		<u> </u>	5.1		5.5	
		2047	+			+		
		2048				+		
		2048	-		 	+		
		2049	-		+	+		
Diatribution of O	has for Freire							
Distribution of Cras	ries for Entire i	гасшту	F = 41	4 a al N		Durder '	ha Ctl. 5	Dania d
Crash Type	Crash T	ype Category			er of Crash			
	· ·		Total	K	Α	В	С	PDO
Multiple vehicle	Head-on crasl		4.0	0.0		0.3	1.4	2.2
	Right-angle cr		98.2	0.1		6.3	28.8	62.0
	Rear-end cras	shes:	334.5	0.5		21.6	90.3	218.4
	Sideswipe cra	shes:	81.7	0.1	0.5	2.7	10.1	68.4
		-vehicle crashes:	11.5	0.0	0.1	0.6	2.2	8.6
		e-vehicle crashes:	529.9	0.7	5.4	31.5	132.8	359.5
Single vehicle	Crashes with		0.9	0.0		0.0	0.1	0.8
onigie venicie	Crashes with		85.1	0.5		7.0	21.3	54.9
	Crashes with							
		other object:	6.8	0.0		0.3	1.0	5.5
		Crashes with parked vehicle:						
	Crashes with	parked vehicle:	1.8	0.0		0.1	0.4	1.2
	Crashes with Other single-v	parked vehicle: ehicle crashes	18.7	0.2	0.5	2.5	7.7	7.8
	Crashes with Other single-v	parked vehicle:			0.5 2.1			

	Evaluation Site Summary							
General In	formation		Lvaiuai	ion one o	uniniai y			
Project des		I-270 From	MD 187 to MD 355/I-4	.95				
Analyst:		NK	Date:	1/31/22		Area type:	Urban	
First year o		2027	Total length of freeway		for Study F		1.420	
Last year o		2045	Total longth of hooway	, ooginonio	ioi otaay i	criod (IIII).	1.420	
Site Descr		2010						
Freeway S								
Number	Lanes	Study Period	Study Period Descripti	on				
ramber	Larios	Length (mi)	Ciddy i chod Booonpa	OII				
1	4		GP MP 1.58 - MP 1.44					
2	4	0.030	GP MP 1.44 - MP 1.41					
3	4	0.410	GP MP 1.41 - MP 1.00					
4	5	0.360	GP MP 1.00 - MP 0.64					
5	6	0.430	GP MP 0.64 - MP 0.21					
6	5	0.050	GP MP 0.21 - MP 0.16					
7	0	0.000	0					
8	0	0.000	0					
9	0	0.000	0					
10	0	0.000	0					
11	0	0.000	0					
12	0	0.000	0					
13	0	0.000	0					
14	0	0.000	0					
15	0	0.000	0					
16	0	0.000	0					
17	0	0.000	0					
18	0	0.000	0					
19	0	0.000	0					
20	0	0.000	0					
Ramp Seg	ments		<u> </u>					
	Study Perio	od		Number	Study Peri	od		
	Description				Description			
		om I-270 NB t		21	0			
		om MD 187 N		22	0			
	G4-3 Ramp fr	om MD 187 N		23	0			
4	G6-4 Ramp fr	om I-270 SB to		24	0			
5	G6-5 Ramp fr	om I-270 SB to		25	0			
6	G8-6 Ramp fr	om MD 187 to		26	0			
7	G8-10 Ramp	from MD 187 t		27	0			
8	0			28	0			
	0			29	0			
	0			30	0			
	0			31	0			
	0			32	0			
	0			33	0			
	0			34	0			
	0			35	0			
	0			36	0			
	0			37	0			
_	0			38	0			
	0			39	0			
20 C rossross	0 I Bomp Tor	min - I-		40	0			
Number	Ramp Ter Config.	<i>minais</i> Control	Study Period Descripti	on				
1	D4	Signal	MD 187 at I-270 NB					
2	D4	Signal	MD 187 at I-270 SB					
3	0	Ö	0					
4	0	0	0					
5	0	0	0					
6	0	0	0					

		Out	put Summa	ary				
General Information								
Project description:	I-270 From MD 187	to MD 355/I-4	95					
Analyst:	NK	Date:	1/31/22		Area type: Urban			
First year of analysis:	2027							
Last year of analysis:	2045							
Crash Data Descript								
Freeway segments	Segment crash data	a available?		No	Firet year o	f crash data		
Freeway segments			, +		,			
	Project-level crash of		<u> </u>	No		f crash data		
Ramp segments	Segment crash data			No	•	f crash data		
	Project-level crash		?	No		f crash data		
Ramp terminals	Segment crash data			No		f crash data		
	Project-level crash	data available?	?	No	Last year o	f crash data:		
Estimated Crash Sta	ntistics							
Crashes for Entire F	acility		Total	K	Α	В	С	PDO
Estimated number of crash	es during Study Period cr	ashes:	1617.9	5.2	19.8	112.8	450.2	1029.9
Estimated average crash from	• •		85.2	0.3	1.0	5.9	23.7	54.2
Crashes by Facility		Nbr. Sites	Total	K	Α	В	C	PDO
Freeway segments, c		6	996.2	4.4	12.0	65.9	213.6	700.4
Ramp segments, cras		7	66.6	0.6	1.7	7.3	19.2	37.9
Crossroad ramp termi		2	555.0	0.2	6.0	39.6	217.5	291.7
Crashes for Entire F	acility by Year	Year	Total	K	Α	В	С	PDO
Estimated number of	crashes during	2027	85.2	0.3	1.0	5.9	23.7	54.2
the Study Period, cras		2028	85.2	0.3	1.0	5.9	23.7	54.2
,		2029	85.2	0.3	1.0	5.9	23.7	54.2
		2030	85.2	0.3	1.0	5.9	23.7	54.2
		2030	85.2	0.3	1.0	5.9	23.7	54.2
					_			
		2032	85.2	0.3	1.0	5.9	23.7	54.2
		2033	85.2	0.3	1.0	5.9	23.7	54.2
		2034	85.2	0.3	1.0	5.9	23.7	54.2
		2035	85.2	0.3	1.0	5.9	23.7	54.2
		2036	85.2	0.3	1.0	5.9	23.7	54.2
		2037	85.2	0.3	1.0	5.9	23.7	54.2
		2038	85.2	0.3	1.0	5.9	23.7	54.2
		2039	85.2	0.3	1.0	5.9	23.7	54.2
		2040	85.2	0.3		5.9	23.7	
					1.0			54.2
		2041	85.2	0.3	1.0	5.9	23.7	54.2
		2042	85.2	0.3	1.0	5.9	23.7	54.2
		2043	85.2	0.3	1.0	5.9	23.7	54.2
		2044	85.2	0.3	1.0	5.9	23.7	54.2
		2045	85.2	0.3	1.0	5.9	23.7	54.2
		2046					İ	
		2047	1					
		2048						
		2049	+			+		
		2050	+			+		
Distribution of Crasi	has for Entire Easili							
וייטווטעווטנים UI GIASI	les for Entire Facility	·y	Eatim -	tod Nicos	er of Crash	oe Durine 4	ho Ctudu F	Poriod
Crash Type	Crash Type C	ategory	Total	K	A A	B B	C C	PDO
Multiple	Hand on the						_	
Multiple vehicle	Head-on crashes:		7.9	0.0	0.1	0.8	3.7	3.2
	Right-angle crashes	3:	149.3	0.2	1.8	11.8	61.3	74.2
	Rear-end crashes:		881.9	2.7	10.8	63.3	260.4	544.5
	Sideswipe crashes:		248.0	0.6	2.0	11.0	39.4	195.0
	Other multiple-vehic	cle crashes:	29.4	0.1	0.4	2.0	7.2	19.7
	Total multiple-veh		1316.4	3.7	15.1	89.0	372.0	836.7
Single vehicle	Crashes with anima		3.5	0.0	0.0	0.1	0.2	3.2
Single verileic			219.8	1.1	3.3	16.9	54.9	143.6
Crashes with fixed objective Crashes with other objective.								
	Crashes with other object:		27.3	0.1	0.2	1.0	3.3	22.8
		Crashes with parked vehicle:						
	Crashes with parket		4.6	0.0	0.1	0.3	1.1	3.1
	Crashes with parked Other single-vehicle	crashes	46.3	0.3	1.1	5.6	18.7	20.6
	Crashes with parket	crashes le crashes:			1.1			

	Evaluation Site Summary								
General In	formation					-			
Project des		I-270 West	Spur From Westlal	ke Terrac	e to I-	270_Phase	1 Build		
Analyst:		DK	Date:	1/31/			Area type:		Urban
First year o		2027	Total length of free					0.660	
Last year o		2045	· ·	, ,		•	` ,		
Site Descr									
Freeway S									
Number	Lanes	Study Period	Study Period Desc	ription					
		Length (mi)	,	•					
1	7		GP MP 1.15 - MP 1.29						
2	7	0.520	GP MP 1.29 - MP 1.81						
3	0	0.000	0						
4	0	0.000	0						
5	0	0.000	0						
6	0	0.000	0						
7	0	0.000	0						
8	0	0.000	0						
9	0	0.000	0						
10	0	0.000	0						
11	0	0.000	0						
12	0	0.000	0						
13	0	0.000	0						
14	0	0.000	0						
15	0	0.000	0						
16	0	0.000	0						
17	0	0.000	0						
18	0	0.000	0						
19	0	0.000	0						
20	0	0.000	0						
Ramp Seg		0.000							
Number	Study Perio	nd		Nun	nber	Study Perio	od		
	Description			T T G	11001	Description			
		om Westlake		2	1	0			
		om I-270 Y SE			2	0			
		m I-270 Y NB			:3	0			
		m Westlake T			4	0			
	0				:5	0			
	0				6	0			
	0				7	0			
	0				8	0			
	0				9	0			
	0				0	0			
	0			3		0			
	0			3	2	0			
	0				3	0			
	0				4	0			
	0				5	0			
	0				6	0			
	0				7	0			
	0				8	0			
	0				9	0			
	0				.0	0			
	Ramp Ter	rminals							
Number	Config.		Study Period Desc	ription					
1	0	0	0						
2	0	0	0						
3	0	0	0						
4	0	0	0						
5	0	0	0						
6	0	0	0						

		Out	tput Summa	ary				
General Information								
Project description:	I-270 West Spur Fr	om Westlake T	errace to I-2	270 Phase	1 Build			
Analyst:	DK		1/31/22		Area type: Urban			
First year of analysis:	2027	1			,,			
Last year of analysis:								
Crash Data Descript								
Freeway segments	Segment crash dat	a available?		No	First year o	f crash data		
Freeway segments		,		First year of crash data:				
	Project-level crash		?	No		f crash data		
Ramp segments	Segment crash dat			No	•	f crash data		
	Project-level crash		?	No	,	f crash data		
Ramp terminals	Segment crash dat			No	First year o	f crash data	:	
	Project-level crash	data available?	?	No	Last year of	f crash data:	:	
Estimated Crash Sta	atistics							
Crashes for Entire F	acility		Total	K	Α	В	С	PDO
Estimated number of crash		rachec.	607.4	3.0	8.3	45.1	125.4	425.6
Estimated average crash fr			32.0	0.2	0.4	2.4	6.6	22.4
					_		C 0.0	PDO
Crashes by Facility		Nbr. Sites	Total	K	Α	В		
Freeway segments, c		2	573.8	2.7	7.4	40.3	116.9	406.6
Ramp segments, cras		4	33.6	0.3	0.9	4.8	8.5	18.9
Crossroad ramp term	inals, crashes:	0	0.0	0.0	0.0	0.0	0.0	0.0
Crashes for Entire F	acility by Year	Year	Total	K	Α	В	С	PDO
Estimated number of		2027	32.0	0.2	0.4	2.4	6.6	22.4
the Study Period, cras		2028	32.0	0.2	0.4	2.4	6.6	22.4
and Study i Cilou, Olas	J. 100.	2029	32.0	0.2	0.4	2.4	6.6	22.4
		2030	32.0	0.2	0.4	2.4	6.6	22.4
		2031	32.0	0.2	0.4	2.4	6.6	22.4
		2032	32.0	0.2	0.4	2.4	6.6	22.4
		2033	32.0	0.2	0.4	2.4	6.6	22.4
		2034	32.0	0.2	0.4	2.4	6.6	22.4
		2035	32.0	0.2	0.4	2.4	6.6	22.4
		2036	32.0	0.2	0.4	2.4	6.6	22.4
		2037	32.0	0.2	0.4	2.4	6.6	22.4
		2038	32.0	0.2	0.4	2.4	6.6	22.4
		2039	32.0	0.2	0.4	2.4	6.6	22.4
		2040	32.0	0.2	0.4	2.4	6.6	22.4
		2041	32.0	0.2	0.4	2.4	6.6	22.4
		2042	32.0	0.2	0.4	2.4	6.6	22.4
		2043	32.0	0.2	0.4	2.4	6.6	22.4
		2044	32.0	0.2	0.4	2.4	6.6	22.4
		2045	32.0	0.2	0.4	2.4	6.6	22.4
		2046						
		2047				1		
		2048			1	+		
		2049			1	+		
1		2049						
1		2050						
Di 4 '' '' ' ' '		2050						
Distribution of Cras	hes for Entire Facili							
		ity				es During t		
Crash Type	hes for Entire Facili	ity	Estima Total	ited Numb	er of Crash	es During t	he Study F	Period PDO
		ity						
Crash Type	Crash Type C	ategory	Total	K	Α	В	С	PDO
Crash Type	Crash Type (Head-on crashes: Right-angle crashe	ategory	Total 1.5 9.6	0.0 0.1	0.0 0.2	0.2 0.9	0.7 2.6	PDO 0.6 5.9
Crash Type	Crash Type (Head-on crashes: Right-angle crashes: Rear-end crashes:	Category s:	Total 1.5 9.6 310.5	0.0 0.1 1.6	0.0 0.2 4.2	0.2 0.9 23.2	0.7 2.6 67.0	9DO 0.6 5.9 214.5
Crash Type	Crash Type Communication Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes	Category s:	Total 1.5 9.6 310.5 112.5	0.0 0.1 1.6 0.4	0.0 0.2 4.2 1.0	B 0.2 0.9 23.2 5.6	0.7 2.6 67.0 16.1	9DO 0.6 5.9 214.5 89.4
Crash Type	Crash Type C Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehi	Category s: cle crashes:	Total 1.5 9.6 310.5 112.5 11.1	0.0 0.1 1.6 0.4 0.1	0.0 0.2 4.2 1.0 0.2	B 0.2 0.9 23.2 5.6 0.9	0.7 2.6 67.0 16.1 2.7	9DO 0.6 5.9 214.5 89.4 7.2
Crash Type Multiple vehicle	Crash Type C Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehi Total multiple-veh	category s: cle crashes: nicle crashes:	Total 1.5 9.6 310.5 112.5 11.1 445.3	0.0 0.1 1.6 0.4 0.1 2.1	0.0 0.2 4.2 1.0 0.2 5.6	B 0.2 0.9 23.2 5.6 0.9 30.9	0.7 2.6 67.0 16.1 2.7 89.1	9DO 0.6 5.9 214.5 89.4 7.2 317.6
Crash Type	Crash Type C Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehi Total multiple-veh Crashes with anima	category s: cle crashes: nicle crashes:	Total 1.5 9.6 310.5 112.5 11.1 445.3 2.0	0.0 0.1 1.6 0.4 0.1 2.1	0.0 0.2 4.2 1.0 0.2 5.6 0.0	B 0.2 0.9 23.2 5.6 0.9 30.9 0.0	0.7 2.6 67.0 16.1 2.7 89.1 0.1	PDO 0.6 5.9 214.5 89.4 7.2 317.6
Crash Type Multiple vehicle	Crash Type C Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehi Total multiple-veh Crashes with anima Crashes with fixed	category s: cle crashes: nicle crashes: al: object:	Total 1.5 9.6 310.5 112.5 11.1 445.3 2.0 117.1	0.0 0.1 1.6 0.4 0.1 2.1	0.0 0.2 4.2 1.0 0.2 5.6	B 0.2 0.9 23.2 5.6 0.9 30.9	0.7 2.6 67.0 16.1 2.7 89.1	PDO 0.6 5.9 214.5 89.4 7.2 317.6 1.8 78.6
Crash Type Multiple vehicle	Crash Type C Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehi Total multiple-veh Crashes with anima	category s: cle crashes: nicle crashes: al: object:	Total 1.5 9.6 310.5 112.5 11.1 445.3 2.0	0.0 0.1 1.6 0.4 0.1 2.1	0.0 0.2 4.2 1.0 0.2 5.6 0.0	B 0.2 0.9 23.2 5.6 0.9 30.9 0.0	0.7 2.6 67.0 16.1 2.7 89.1 0.1	PDO 0.6 5.9 214.5 89.4 7.2 317.6 1.8 78.6
Crash Type Multiple vehicle	Crash Type C Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehi Total multiple-veh Crashes with anima Crashes with fixed	category s: cle crashes: nicle crashes: al: object: object:	Total 1.5 9.6 310.5 112.5 11.1 445.3 2.0 117.1	0.0 0.1 1.6 0.4 0.1 2.1 0.0 0.7	0.0 0.2 4.2 1.0 0.2 5.6 0.0	B 0.2 0.9 23.2 5.6 0.9 30.9 0.0 10.1	0.7 2.6 67.0 16.1 2.7 89.1 0.1 25.8	9DO 0.6 5.9 214.5 89.4 7.2 317.6
Crash Type Multiple vehicle	Crash Type C Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehi Total multiple-vehi Crashes with anima Crashes with fixed Crashes with other Crashes with parke	category s: cle crashes: nicle crashes: al: object: object: d vehicle:	Total 1.5 9.6 310.5 112.5 11.1 445.3 2.0 117.1 17.0 2.4	0.0 0.1 1.6 0.4 0.1 2.1 0.0 0.7 0.0 0.0	A 0.0 0.2 4.2 1.0 0.2 5.6 0.0 1.9 0.1 0.0	B 0.2 0.9 23.2 5.6 0.9 30.9 0.0 10.1 0.6 0.2	0.7 2.6 67.0 16.1 2.7 89.1 0.1 25.8 1.8	PDO 0.6 5.9 214.5 89.4 7.2 317.6 1.8 78.6
Crash Type Multiple vehicle	Crash Type C Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehi Total multiple-veh Crashes with anima Crashes with fixed Crashes with other	category s: cle crashes: nicle crashes: al: object: object: d vehicle: e crashes	Total 1.5 9.6 310.5 112.5 11.1 445.3 2.0 117.1 17.0	0.0 0.1 1.6 0.4 0.1 2.1 0.0 0.7	A 0.0 0.2 4.2 1.0 0.2 5.6 0.0 1.9 0.1	B 0.2 0.9 23.2 5.6 0.9 30.9 0.0 10.1 0.6	0.7 2.6 67.0 16.1 2.7 89.1 0.1 25.8 1.8	PDO 0.6 5.9 214.5 89.4 7.2 317.6 1.8 78.6 14.5

	Evaluation Site Summary							
General In	formation							
Project des		I-270 West	Spur From Democracy	/ Blvd to W	estlake Teri	race Phase	1 Build	
Analyst:		DK		1/31/22		Area type:		Urban
First year o	f analysis:	2027	Total length of freeway		for Study F	Period (mi):	0.350	
Last year o		2045	.g	J56		- ()	000	
Site Descr								
Freeway S								
Number	Lanes	Study Period	Study Period Descripti	on				
		Length (mi)	,					
1	6	0.150	GP MP 0.80 - MP 0.95					
2	6	0.010	GP MP 0.95 - MP 0.96					
3	7	0.020	GP MP 0.96 - MP 0.98					
4	7	0.170	GP MP 0.98 - MP 1.15					
5	0	0.000	0					
6	0	0.000	0					
7	0	0.000	0					
8	0	0.000	0					
9	0	0.000	0					
10	0	0.000	0					
11	0	0.000	0					
12	0	0.000	0					
13	0	0.000						
13	0	0.000	0 0					
15	0	0.000						
16	0	0.000	0 0					
17	0	0.000	0					
18	0	0.000	0					
19	0	0.000	0					
20	0	0.000	0					
Ramp Seg		0.000	U .					
	Study Perio	nd		Number	Study Peri	od		
ramber	Description			rtarribor	Description			
1		om I-270 Y NE		21	0			
2	-	om I-270 Y NE		22	0			
3		om Democrac		23	0			
4		om Democrac		24	0			
5	-	om I-270 Y NE		25	0			
6	-	om I-270 Y NE		26	0			
7	-	om I-270 Y NE		27	0			
8		from Democra		28	0			
9		from Democra		29	0			
10	-	om I-270 Y SE		30	0			
11		om I-270 Y SE		31	0			
12	0			32	0			
13	0			33	0			
14	0			34	0			
15	0			35	0			
16	0			36	0			
17	0			37	0			
18	0			38	0			
19	0			39	0			
20	0			40	0			
	Ramp Ter	minals						
Number	Config.	Control	Study Period Descripti	on				
1	D3ex	Signal	Democracy Boulevard at I-2	70Y NB				
2	D3CX D4	Signal	Democracy Boulevard at I-2					
3	0	0	0					
4	0	0	0					
5	0	0	0					
6	0	0	0					
J	U	U	٧					

		Out	put Summa	arv				
General Information				,				
Project description:	I-270 West Sr	our From Democracy	Blvd to We	stlake Terr	ace Phase	1 Build		
Analyst:	DK		1/31/22		Area type:		Jrban	
First year of analysis:	1=::	Date.	170 1722		r a ou typo.	I.	<u> </u>	
Last year of analysis:								
Crash Data Descript								
		h data available?		No	First year o	f araah data	. 1	
Freeway segments		sh data available?	,	No First year of crash da No Last year of crash da				
		crash data available?	, <u> </u>	No	,			
Ramp segments		sh data available?		No	_	f crash data		
		crash data available?	,	No		f crash data		
Ramp terminals		sh data available?		No		f crash data		
	Project-level of	crash data available?)	No	Last year of	f crash data	:	
Estimated Crash Sta	atistics							
Crashes for Entire F	acility		Total	K	Α	В	С	PDO
Estimated number of crash	es durina Study Pe	eriod, crashes:	715.1	2.1	9.6	56.3	211.3	435.8
Estimated average crash fr			37.6	0.1	0.5	3.0	11.1	22.9
Crashes by Facility		Nbr. Sites	Total	K	Α	В	С	PDO
Freeway segments, c		4	273.2	1.4		20.3	57.9	189.9
Ramp segments, cras		11	56.5	0.5	3.7 1.6	8.6	13.2	32.6
		2	385.4	0.5	4.3	27.3	140.2	213.3
Crossroad ramp term	· · · · · · · · · · · · · · · · · · ·	=,			_	_	_	
Crashes for Entire F			Total	K	Α	В	С	PDO
Estimated number of	J		37.6	0.1		3.0	11.1	22.9
the Study Period, cras	shes:	2028	37.6	0.1	0.5	3.0	11.1	22.9
		2029	37.6	0.1	0.5	3.0	11.1	22.9
		2030	37.6	0.1	0.5	3.0	11.1	22.9
		2031	37.6	0.1	0.5	3.0	11.1	22.9
		2032	37.6	0.1	0.5	3.0	11.1	22.9
		2033	37.6	0.1	0.5	3.0	11.1	22.9
		2034	37.6	0.1	0.5	3.0	11.1	22.9
		2035	37.6	0.1	0.5	3.0	11.1	22.9
		2036	37.6	0.1	0.5	3.0	11.1	22.9
		2037	37.6	0.1	0.5	3.0	11.1	22.9
								_
		2038	37.6	0.1	0.5	3.0	11.1	22.9
		2039	37.6	0.1	0.5	3.0	11.1	22.9
		2040	37.6	0.1	0.5	3.0	11.1	22.9
		2041	37.6	0.1	0.5	3.0	11.1	22.9
		2042	37.6	0.1	0.5	3.0	11.1	22.9
		2043	37.6	0.1	0.5	3.0	11.1	22.9
		2044	37.6	0.1	0.5	3.0	11.1	22.9
		2045	37.6	0.1	0.5	3.0	11.1	22.9
		2046						
		2047						
		2048						
		2049						
		2050						
Distribution of Cras	hes for Entire						<u>_</u>	
			Estima	ted Numb	er of Crash	es Durina t	he Study F	Period
Crash Type	Crash T	ype Category	Total	K	A	B	C	PDO
Multiple vehicle	Head-on cras	hes.	4.2	0.0	0.1	0.4	1.9	1.8
ividiupie veriide	Right-angle or		96.3	0.0	1.2	7.6	37.7	49.8
	Rear-end cras		377.0	0.9	4.9	29.4	121.4	220.4
	Sideswipe cra		96.7	0.2	0.7	4.1	14.0	77.8
		e-vehicle crashes:	12.0	0.0	0.1	0.8	2.7	8.2
	Total multip	le-vehicle crashes:	586.2	1.2	7.1	42.3	177.6	358.0
Single vehicle	Crashes with	animal:	0.9	0.0	0.0	0.0	0.1	0.8
_	Crashes with	fixed object:	94.9	0.6	1.8	9.8	23.2	59.5
	Crashes with		9.4	0.0	0.1	0.5	1.2	7.6
			2.1	0.0		0.2	0.5	1.4
	Crashes with parked vehicle: Other single-vehicle crashes		21.6	0.0	0.6	3.5	8.7	8.5
								0.0
	Total single-	-vehicle crashes: otal crashes:	128.9 715.1	0.8		14.0 56.3	33.7 211.3	77.8 435.8

	Evaluation Site Summary							
General In	formation				,			
Project des		I-270 West	Spur From I-495 to De	mocracy B	lvd Phase	1 Build		
Analyst:		DK		1/31/22		Area type:	Urban	
First year o	of analysis:	2027	Total length of freeway		for Study F	Period (mi):	0.800	
Last year o		2045		, 3	· · · · · · · · · · · · · · · · · · ·	,		
Site Descr								
Freeway S								
Number	Lanes	Study Period	Study Period Descripti	on				
	2400	Length (mi)	John J. Silver Description					
1	6		GP MP 0.00 - MP 0.28					
2	6	0.050	GP MP 0.28 - MP 0.33					
3	6	0.100	GP MP 0.33 - MP 0.43					
4	6	0.200	GP MP 0.43 - MP 0.63					
5	5	0.100	GP MP 0.63 - MP 0.73					
6	6	0.070	GP MP 0.73 - MP 0.80					
7	0	0.000	0					
8	0	0.000	0					
9	0	0.000	0					
10	0	0.000	0					
11	0	0.000	0					
12	0	0.000	0					
13	0	0.000	0					
14	0	0.000	0					
15	0	0.000	0					
16	0	0.000	0					
17	0	0.000	0					
18	0	0.000	0					
19	0	0.000	0					
20	0	0.000	0					
Ramp Seg			_					
	Study Perio	od		Number	Study Peri	od		
	Description				Description			
	0			21	0			
	0			22	0			
	0			23	0			
4	0			24	0			
5	0			25	0			
6	0			26	0			
	0			27	0			
	0			28	0			
	0			29	0			
	0			30	0			
	0			31	0			
	0			32	0			
	0			33	0			
	0			34	0			
	0			35	0			
	0			36	0			
	0			37	0			
	0			38	0			
	0			39	0			
	0			40	0			
Number Number	Ramp Ter Config.		Study Period Descripti	on				
1	0	0	0					
2	0	0	0					
3	0	0	0					
4	0	0	0					
5	0	0	0					
6	0	0	0					
Ÿ	Ü	_ `	ı -					

		Out	tput Summa	ary				
General Information								
Project description:	I-270 West Spur Fro	m I-495 to De	mocracy Blv	/d Phase	1 Build			
Analyst:	DK		1/31/22		Area type: Urban			
First year of analysis:	2027							
Last year of analysis:	2045							
Crash Data Descript								
Freeway segments	Segment crash data	available?		No	Firet year o	f crash data	.	
Freeway segments			,		,			
	Project-level crash d		?	No		f crash data		
Ramp segments	Segment crash data			No		f crash data		
	Project-level crash d		?	No	,	f crash data		
Ramp terminals	Segment crash data			No		f crash data		
	Project-level crash d	ata available?	?	No	Last year o	f crash data	:	
Estimated Crash Sta	tistics							
Crashes for Entire F	acility		Total	K	Α	В	С	PDO
Estimated number of crash	es during Study Period, cra	shes:	856.5	3.3	9.1	50.9	168.1	625.1
Estimated average crash from	• •		45.1	0.2	0.5	2.7	8.8	32.9
Crashes by Facility		Nbr. Sites	Total	K	Α	В	C 0.0	PDO
Freeway segments, c		6	856.5	3.3		50.9	168.1	625.1
Ramp segments, cras		0	0.0	0.0	0.0	0.0	0.0	0.0
Crossroad ramp termi		0	0.0	0.0	0.0	0.0	0.0	0.0
Crashes for Entire F	acility by Year	Year	Total	K	Α	В	С	PDO
Estimated number of	crashes during	2027	45.1	0.2	0.5	2.7	8.8	32.9
the Study Period, cras	0	2028	45.1	0.2	0.5	2.7	8.8	32.9
,		2029	45.1	0.2	0.5	2.7	8.8	32.9
		2030	45.1	0.2	0.5	2.7	8.8	32.9
		2030	45.1	0.2	0.5	2.7	8.8	32.9
		2032	45.1	0.2	0.5	2.7	8.8	32.9
		2033	45.1	0.2	0.5	2.7	8.8	32.9
		2034	45.1	0.2	0.5	2.7	8.8	32.9
		2035	45.1	0.2	0.5	2.7	8.8	32.9
		2036	45.1	0.2	0.5	2.7	8.8	32.9
		2037	45.1	0.2	0.5	2.7	8.8	32.9
		2038	45.1	0.2	0.5	2.7	8.8	32.9
		2039	45.1	0.2	0.5	2.7	8.8	32.9
		2040	45.1	0.2	0.5	2.7	8.8	32.9
		2040	45.1	0.2	0.5	2.7	8.8	32.9
		2041		0.2				
			45.1		0.5	2.7	8.8	32.9
		2043	45.1	0.2	0.5	2.7	8.8	32.9
		2044	45.1	0.2	0.5	2.7	8.8	32.9
		2045	45.1	0.2	0.5	2.7	8.8	32.9
		2046						
		2047						
		2048						
		2049						
		2050			1			
Distribution of Crasl	hes for Entire Escilit				I			
			Estima	tad Numb	er of Crash	os During f	he Study F	Pariod
Crash Type	Crash Type Ca	ategory	Total	K	A A	B B	C C	PDO
Multiple vehicle	Hood on creekes:					_	_	
Multiple vehicle	Head-on crashes:		2.3	0.0	0.0	0.3	0.9	1.0
	Right-angle crashes	-	12.5	0.1	0.2	0.9	3.1	8.3
	Rear-end crashes:		472.3	1.9	5.2	28.7	94.8	341.9
	Sideswipe crashes:		147.3	0.5	1.3	7.4	24.5	113.5
	Other multiple-vehic	le crashes:	15.1	0.1	0.2	1.0	3.3	10.5
	Total multiple-vehi	cle crashes:	649.5	2.5	6.9	38.3	126.5	475.3
Single vehicle	Crashes with animal		3.5	0.0	0.0	0.0	0.1	3.4
Single vehicle Crashes with animal: Crashes with fixed object			152.8	0.6	1.6	9.1	30.1	111.3
		hioct:	22 4	Λ Λ				
	Crashes with other of		23.1	0.0	0.1	0.7	2.4	
	Crashes with other of Crashes with parked	l vehicle:	1.7	0.0	0.0	0.1	0.4	19.7
	Crashes with other of Crashes with parked Other single-vehicle	vehicle: crashes	1.7 25.9	0.0 0.2	0.0 0.5	0.1 2.6	0.4 8.6	1.2 14.1
•	Crashes with other of Crashes with parked	vehicle: crashes crashes:	1.7	0.0	0.0 0.5	0.1	0.4	1.2

Evaluation Site Summary									
General In	formation								
Project des	cription:	I-495 VA F	rom VA 19	3 (Southerr	n Study Limi	t) to GWMF	Phase 1 B	uild	
Analyst:		DK		Date:	1/31/22		Area type:		Jrban
First year o	f analysis:	2027	Total lengt	h of freewa	y segments	for Study F	Period (mi):	1.352	
Last year o		2045	J		, ,	•	, ,		
Site Descr									
Freeway S									
Number	Lanes	Study Period	Study Peri	od Descrin	tion				
Number	Lancs	Length (mi)	Olddy i Cii	od Descrip	tion				
1	10	0.254	GP MP 13.72	MD 12 07					
2	9	0.234	GP MP 13.72						
3	9	0.010							
			GP MP 13.97						
4	8	0.207	GP MP 14.15						
5	9	0.178	GP MP 14.36						
6	9	0.361	GP MP 14.54						
7	8	0.015	GP MP 14.90						
8	9	0.145	GP MP 14.92	2 - MP 15.06					
9	0	0.000	0						
10	0	0.000	0						
11	0	0.000	0						
12	0	0.000	0						
13	0	0.000	0						
14	0	0.000	0						
15	0	0.000	0						
16	0	0.000	0						
17	0	0.000	0						
18	0	0.000	0						
19	0	0.000	0						
20	0	0.000	0						
Ramp Seg	ments	•							
	Study Perio	od			Number	Study Peri	od		
	Description					Description			
		A 193 WB to I-			21	0			
2		A 193 WB to I-			22	0			
3		495 SB C-D R			23	0			
4	Ramp from I-4	495 SB to VA			24	0			
5	Ramp from I-4	495 NB to VA			25	0			
6	Ramp from I-4	495 SB GP to			26	0			
7	SB CD-1 I-49				27	0			
8		n I-495 SB to V			28	0			
	0				29	0			
	0				30	0			
	0				31	0			
	0				32	0			
	0				33	0			
	0				34	0			
	0				35	0			
	0				36	0			
	0				37	0			
	0				38	0			
19	0				39	0			
20	0				40	0			
	∪ I Ramp Tei	minale			70	ľ			
Number	Config.	Control	Study Peri	od Descrip	tion				
1	D4	Signal	VA 193 at I-4	95 NB					
2	D4	Signal	VA 193 at I-4						
3	0	0	0						
4	0	0	0						
5	0	0	0						
6	0	ő	0						
Ĭ	·		-				I		

		Out	put Summa	arv				
General Information	1			•				
Project description:	I-495 VA From VA 19	3 (Southern	Study Limi	t) to GWM	P Phase 1	Build		
Analyst:	DK		4/7/2022	, -	Area type:		Urban	
First year of analysis			.,,,		<u> - </u>			
Last year of analysis								
Crash Data Descrip								
Freeway segments	Segment crash data	available?	Т	No	First year o	of crash data	a·	
riceway segments	Project-level crash da		2	No		of crash data		
Ramp segments	Segment crash data			No	•	of crash data		
Namp segments	Project-level crash da		2	No	,			
Damen tamainala	Segment crash data		f	No	Last year of crash data: First year of crash data:			
Ramp terminals			2	No		of crash data		
Estimated Crock Ct	Project-level crash data ava timated Crash Statistics			NO	Last year c	ii Crasii uala	1.	
		1	T-4-1	1/			_	DDO
Crashes for Entire I			Total	K	Α	В	C	PDO
	nes during Study Period, cra		2460.2	6.5		139.8	554.2	1739.2
	req. during Study Period, cra		129.5	0.3	1.1	7.4	29.2	91.5
Crashes by Facility	Component	Nbr. Sites	Total	K	Α	В	С	PDO
Freeway segments, o		8	1996.1	5.8	15.9	112.8	433.9	1427.6
Ramp segments, cra		8	86.7	0.6		8.6	19.3	56.5
Crossroad ramp term		2	377.3	0.1	2.8	18.4	100.9	255.1
Crashes for Entire I	Facility by Year	Year	Total	K	Α	В	С	PDO
Estimated number of		2027	129.5	0.3	1.1	7.4	29.2	91.5
the Study Period, cra	· ·	2028	129.5	0.3		7.4	29.2	91.5
, , , , , , , , , , , , , , , , , , , ,		2029	129.5	0.3		7.4	29.2	91.5
		2030	129.5	0.3		7.4	29.2	91.5
		2031	129.5	0.3		7.4	29.2	91.5
		2032	129.5	0.3		7.4	29.2	91.5
		2033	129.5	0.3		7.4	29.2	91.5
		2034	129.5	0.3		7.4	29.2	91.5
		2035	129.5	0.3		7.4	29.2	91.5
		2036	129.5	0.3		7.4	29.2	91.5
		2036		0.3			29.2	
			129.5			7.4		91.5
		2038	129.5	0.3	1.1	7.4	29.2	91.5
		2039	129.5	0.3		7.4	29.2	91.5
		2040	129.5	0.3		7.4	29.2	91.5
		2041	129.5	0.3	1.1	7.4	29.2	91.5
		2042	129.5	0.3		7.4	29.2	91.5
		2043	129.5	0.3		7.4	29.2	91.5
		2044	129.5	0.3	1.1	7.4	29.2	91.5
		2045	129.5	0.3	1.1	7.4	29.2	91.5
		2046						
		2047						
		2048						
		2049						
		2050						
Distribution of Cras	thes for Entire Facility	/						
Crook Turns	Crook Turns Car		Estima	ted Numb	er of Crash	es During	the Study	Period
Crash Type	Crash Type Cat	egory	Total	K	Α	В	С	PDO
Multiple vehicle	Head-on crashes:		9.3	0.0	0.1	0.9	3.9	4.4
•	Right-angle crashes:		122.7	0.2	1.1	7.5	36.5	77.5
	Rear-end crashes:		1385.7	3.6		80.6	325.3	964.5
	Sideswipe crashes:		449.3	0.9	2.5	17.4	67.5	361.1
	Other multiple-vehicle	crashes:	51.9	0.2	0.5	3.3	12.2	35.7
	Total multiple-vehic		2019.0	4.9	15.8	109.7	445.5	1443.1
Single vehicle	Crashes with animal:	0.431103.	6.0	0.0	0.0	0.1	0.3	5.5
onigio veriloie	Crashes with fixed ob	niect:	320.7	1.2	3.3	21.6	77.5	217.2
	Crashes with other of		44.3	0.1	0.2	1.4	5.2	37.4
	Crashes with parked		6.6	0.0	0.1	0.4	1.5	4.6
	Other single-vehicle		63.5	0.4	1.0	6.7	24.0	31.4
Total single-vehicle c		crashes:	441.2	1.6	4.7	30.1	108.6	296.1
	Total cras		2460.2	6.5	20.5	139.8	554.2	1739.2

	Evaluation Site Summary							
General In	formation				,			
Project des		I-495 VA F	rom GWMP to MD Sta	ate Line Pha	ase 1 Build			
Analyst:		DK	Date:	1/31/22		Area type:	U	rban
First year o		2027	Total length of freewa		for Study F		0.345	
Last year o		2045		, ,	,	()		
Site Descr								
Freeway S								
Number	Lanes	Study Period	Study Period Descrip	tion				
rtarribor	Larroo	Length (mi)	Ctady 1 office Bootinp					
1	9	0.176	GP MP 15.06 - MP 15.24					
2	10	0.169	GP MP 15.24 - MP 15.41					
3	0	0.000	0					
4	0	0.000	0					
5	0	0.000	0					
6	0	0.000	0					
7	0	0.000	0					
8	0	0.000	0					
9	0	0.000	0					
10	0	0.000	0					
11	0	0.000	0					
12	0	0.000	0					
13	0							
13	0	0.000 0.000	0					
15	0	0.000						
16	0	0.000	0					
17	0	0.000	0					
18	0	0.000	0					
19	0	0.000	0					
20	0	0.000	0					
Ramp Seg		0.000	<u>U</u>					
	Study Perio	nd		Number	Study Peri	od		
	Description			Number	Description			
		195 SB ML to		21	0			
2		195 SB ML to		22	0			
		195 NB ML to		23	0			
4		195 SB ML to		24	0			
5		195 NB ML an		25	0			
6		195 SB to GW		26	0			
7		195 SB GP an		27	0			
8	-	WMP WB to I-		28	0			
9	-	WMP WB to I-		29	0			
	-	WMP WB to I-		30	0			
11	-	195 NB to GW		31	0			
12	Ramp from I-4	195 NB to GW		32	0			
13	Ramp from I-4	195 NB to I-49		33	0			
14	Ramp from G	WMP WB to I-		34	0			
15	=	195 NB and G		35	0			
16		WMP WB to I-		36	0			
17	0			37	0			
	0			38	0			
	0			39	0			
20	0			40	0			
Crossroad	l Ramp Ter	minals						
Number	Config.		Study Period Descrip	tion				
1	0	0	0					
2	0	0	0					
3	0	0	0					
4	0	0	0					
5	0	0	0					
6	0	0	0					

		Qui	put Summ	arv				
General Information	n	Jul	.put Julilli	~. y				
Project description:	I-495 VA From GWM	P to MD Sta	te Line Ph	ase 1 Build	1			
Analyst:	DK		4/7/2022	acc i Duile	Area type:	Ti.	Jrban	
First year of analysis		Date.	4/1/2022		Alca type.		Jiban	
Last year of analysis								
Crash Data Descrip								
		:		NI-	F:4	£ l l - 4 -		
Freeway segments	Segment crash data			No	First year of crash data:			
	Project-level crash da	?	No	Last year of crash data:				
Ramp segments	Segment crash data a			No	,	of crash data		
	Project-level crash da	ita available	?	No	,	of crash data		
Ramp terminals	Segment crash data a	available?		No	First year o	of crash data	1:	
	Project-level crash dat			No	Last year o	of crash data	:	
Estimated Crash St	tatistics							
Crashes for Entire	Facility		Total	K	Α	В	С	PDO
Estimated number of cras	hes during Study Period, cra-	shes:	687.2	2.4	7.0	47.2	148.2	482.4
	freq. during Study Period, cra		36.2	0.1	0.4	2.5	7.8	25.4
Crashes by Facility		Nbr. Sites	Total	K	Α	В	С	PDO
	-	2	549.6			28.8	118.2	397.1
Freeway segments,		16		1.4	4.0			
Ramp segments, cra			137.6	1.0	3.0	18.4	30.0	85.3
Crossroad ramp tern		0	0.0	0.0	0.0	0.0	0.0	0.0
Crashes for Entire		Year	Total	K	Α	В	С	PDO
Estimated number of	•	2027	36.2	0.1		2.5	7.8	25.4
the Study Period, cra	ashes:	2028	36.2	0.1	0.4	2.5	7.8	25.4
		2029	36.2	0.1	0.4	2.5	7.8	25.4
		2030	36.2	0.1	0.4	2.5	7.8	25.4
		2031	36.2	0.1	0.4	2.5	7.8	25.4
		2032	36.2	0.1	0.4	2.5	7.8	25.4
		2033	36.2	0.1	0.4	2.5	7.8	25.4
		2034	36.2	0.1	0.4	2.5	7.8	25.4
		2035	36.2	0.1	0.4	2.5	7.8	25.4
		2036	36.2	0.1	0.4	2.5	7.8	25.4
		2037	36.2	0.1	0.4	2.5	7.8	25.4
		2038	36.2	0.1	0.4	2.5	7.8	25.4
		2039	36.2	0.1	0.4	2.5	7.8	25.4
		2040	36.2	0.1	0.4	2.5	7.8	25.4
		2041	36.2	0.1	0.4	2.5	7.8	25.4
		2042	36.2	0.1	0.4	2.5	7.8	25.4
		2043	36.2	0.1	0.4	2.5	7.8	25.4
		2044	36.2	0.1	0.4	2.5	7.8	25.4
		2044	36.2	0.1	0.4	2.5	7.8	25.4
			30.2	0.1	0.4	2.3	1.0	20.4
		2046						
		2047						
		2048						
		2049						
		2050						
Distribution of Cras	shes for Entire Facility	/						
Crash Type	Crash Type Cat	enory				es During t		
	Gradii Type Cat	ogory	Total	K	Α	В	С	PDO
Multiple vehicle	Head-on crashes:		2.6	0.0	0.1	0.4	1.0	1.2
	Right-angle crashes:		10.2	0.0	0.1	0.8	3.0	6.2
	Rear-end crashes:		370.1	1.3	3.7	24.9	82.2	258.1
	Sideswipe crashes:		132.5	0.3		5.5	19.0	106.9
	Other multiple-vehicle	crashes.	22.1	0.1	0.4	2.3	5.5	13.9
	Total multiple-vehic		537.5	1.7	5.0	33.8	110.7	386.3
Single vehicle	Crashes with animal:	10 01 a31 lC3.	-					
Single verticle		iooti	1.9	0.0	0.0	0.0	0.1	1.7
	Crashes with fixed ob		110.3	0.5		9.6	27.0	71.8
	Crashes with other of		12.5	0.0	0.1	0.4	1.5	10.5
	Crashes with parked		2.2	0.0	0.0	0.2	0.5	1.4
	Other single-vehicle of	crashes	22.8	0.2	0.5	3.1	8.3	10.8
	Total single-vehicle		149.7	0.7	2.0	13.4	37.5	96.1
	Total crasl		687.2	2.4		47.2	148.2	482.4
	. 5 . 5 . 5 . 6 .		30		0			

	Evaluation Site Summary								
General In	formation		Lvalua	ion one o	anima y				
Project des		I-495 MD F	rom VA State Line to N	/ID 190 Ph	ase 1 Build				
Analyst:		DK		1/31/22		Area type:	Urban		
First year o		2027	Total length of freeway		for Study F		2.400		
Last year o		2045] · · · · · · · · · · · · · · · · · · ·	, 3	·-·, ·				
Site Descr									
Freeway S									
Number	Lanes	Study Period	Study Period Descripti	on					
		Length (mi)							
1	10		GP MP 0.00 - MP 0.32						
2	9	0.060	GP MP 0.32 - MP 0.38						
3	8	0.080	GP MP 0.38 - MP 0.46						
4	8	0.030	GP MP 0.46 - MP 0.49						
5	8	0.100	GP MP 0.49 - MP 0.59						
6	8	1.300	GP MP 0.59 - MP 1.89						
7	8	0.150	GP MP 1.89 - MP 2.04						
8	8	0.170	GP MP 2.04 - MP 2.21						
9	9	0.190	GP MP 2.21 - MP 2.40]			
10	0	0.000	0						
11	0	0.000	0						
12	0	0.000	0						
13	0	0.000	0						
14	0	0.000	0						
15	0	0.000	0						
16	0	0.000	0						
17	0	0.000	0						
18	0	0.000	0						
19	0	0.000	0						
20	0	0.000	0						
Ramp Seg		1		Mondo	O++ D+	1			
	Study Perio			Number	Study Peri Description				
	Description	BP EB to I-495		21	0	1			
		BP EB to I-495		22	0				
3	-	BP EB to I-495		23	0				
4		495 NB to CBF		24	0				
5	-	495 NB to CBF		25	0				
6	=	495 NB to CBF		26	0				
7		BP WB to I-49		27	0				
8	-	495 SB to CBF		28	0				
9	0			29	0				
	0			30	0				
	0			31	0				
	0			32	0				
	0			33	0				
	0			34	0				
	0			35	0				
_	0			36	0				
	0			37	0				
_	0			38	0				
	0			39	0				
20	0 I Damen Tan			40	0				
Number	Ramp Ter Config.	Control	Study Period Descripti	on					
			Gludy Feriod Descripti	UII					
1	0	0	0						
2	0	0	0						
3	0	0	0						
4	0	0	0						
5	0	0	0						
6	0	0	0						

		Out	put Summ	arv						
General Information	n			· ,						
Project description:	I-495 MD From VA St	tate Line to	MD 190 Ph	nase 1 Build	d					
Analyst:	DK	Date:	4/7/2022		Area type:		Urban			
First year of analysis		1				L.				
Last year of analysis										
Crash Data Descrip										
Freeway segments	Segment crash data	availahle?	Ī	No	First year o	of crash data	a·			
i reeway seginenis	Project-level crash da		.2	No	,					
Daman aanmaanta	-		i f		•					
Ramp segments	Segment crash data a		0	No	,	f crash data				
	Project-level crash da		?	No	Last year of crash data: First year of crash data:					
Ramp terminals	Segment crash data a		_	No						
	Project-level crash da	ita available	?	No	Last year o	f crash data	a:			
Estimated Crash St										
Crashes for Entire	Facility		Total	K	Α	В	С	PDO		
Estimated number of cras	hes during Study Period, cra	shes:	4335.0	11.4	31.8	226.6	958.2	3107.1		
Estimated average crash	freq. during Study Period, cra	shes/yr:	228.2	0.6	1.7	11.9	50.4	163.5		
Crashes by Facility	Component	Nbr. Sites	Total	K	Α	В	С	PDO		
Freeway segments,		9	4289.2	11.0	30.7	219.2	947.2	3081.1		
Ramp segments, cra		8	45.8	0.4	1.1	7.4	11.0	25.9		
Crossroad ramp tern		0	0.0	0.0	0.0	0.0	0.0	0.0		
Crashes for Entire		Year	Total	K	A	В	C	PDO		
Estimated number of										
	3	2027	228.2	0.6	1.7	11.9	50.4	163.5		
the Study Period, cra	asnes:	2028	228.2	0.6	1.7	11.9	50.4	163.5		
		2029	228.2	0.6	1.7	11.9	50.4	163.5		
		2030	228.2	0.6	1.7	11.9	50.4	163.5		
		2031	228.2	0.6	1.7	11.9	50.4	163.5		
		2032	228.2	0.6	1.7	11.9	50.4	163.5		
		2033	228.2	0.6	1.7	11.9	50.4	163.5		
		2034	228.2	0.6	1.7	11.9	50.4	163.5		
		2035	228.2	0.6	1.7	11.9	50.4	163.5		
		2036	228.2	0.6	1.7	11.9	50.4	163.5		
		2037	228.2	0.6	1.7	11.9	50.4	163.5		
		2038	228.2	0.6	1.7	11.9	50.4	163.5		
		2039	228.2	0.6	1.7	11.9	50.4	163.5		
		2040	228.2	0.6	1.7	11.9	50.4	163.5		
		2040	228.2	0.6	1.7	11.9	50.4	163.5		
		2041								
			228.2	0.6	1.7	11.9	50.4	163.5		
		2043	228.2	0.6	1.7	11.9	50.4	163.5		
		2044	228.2	0.6	1.7	11.9	50.4	163.5		
		2045	228.2	0.6	1.7	11.9	50.4	163.5		
		2046								
		2047								
		2048		_						
		2049								
		2050								
Distribution of Cus.		,	•							
Distribution of Crashes for Entire Facility										
			Estima	ted Numb	er of Crash	es During	ille Study i	Period		
Crash Type	Crash Type Cat		Estima Total	ted Numb K	er of Crash A	B B	C	Period PDO		
Crash Type			Total		Α					
Crash Type	Crash Type Cat		Total 12.6	K 0.1	A 0.2	B 1.4	C 5.8	PDO 5.2		
Crash Type	Crash Type Cat Head-on crashes: Right-angle crashes:		Total 12.6 74.9	K 0.1 0.3	0.2 0.7	B 1.4 5.1	5.8 22.0	PDO 5.2 46.8		
Crash Type	Crash Type Cat Head-on crashes: Right-angle crashes: Rear-end crashes:		Total 12.6 74.9 2507.2	0.1 0.3 6.6	0.2 0.7 18.5	B 1.4 5.1 131.6	5.8 22.0 561.2	5.2 46.8 1789.4		
Crash Type	Crash Type Cat Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes:	egory	Total 12.6 74.9 2507.2 868.1	0.1 0.3 6.6 1.6	0.2 0.7 18.5 4.5	B 1.4 5.1 131.6 31.8	5.8 22.0 561.2 136.3	5.2 46.8 1789.4 694.0		
Crash Type	Crash Type Cat Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle	e crashes:	Total 12.6 74.9 2507.2 868.1 91.1	0.1 0.3 6.6 1.6 0.3	0.2 0.7 18.5 4.5 0.8	B 1.4 5.1 131.6 31.8 5.6	5.8 22.0 561.2 136.3 22.8	5.2 46.8 1789.4 694.0 61.6		
Crash Type Multiple vehicle	Crash Type Cat Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehicle	e crashes:	Total 12.6 74.9 2507.2 868.1 91.1 3553.8	0.1 0.3 6.6 1.6 0.3 8.8	0.2 0.7 18.5 4.5 0.8 24.6	31.8 5.6 175.5	5.8 22.0 561.2 136.3 22.8 748.0	5.2 46.8 1789.4 694.0 61.6 2596.9		
Crash Type	Crash Type Cat Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehicle Crashes with animal:	e crashes:	70tal 12.6 74.9 2507.2 868.1 91.1 3553.8 11.3	0.1 0.3 6.6 1.6 0.3 8.8 0.0	0.2 0.7 18.5 4.5 0.8 24.6 0.0	B 1.4 5.1 131.6 31.8 5.6 175.5 0.2	5.8 22.0 561.2 136.3 22.8 748.0 0.6	5.2 46.8 1789.4 694.0 61.6 2596.9		
Crash Type Multiple vehicle	Crash Type Cat Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehicle Crashes with animal: Crashes with fixed ob	e crashes: le crashes:	Total 12.6 74.9 2507.2 868.1 91.1 3553.8 11.3 562.4	0.1 0.3 6.6 1.6 0.3 8.8 0.0	0.2 0.7 18.5 4.5 0.8 24.6 0.0 5.2	B 1.4 5.1 131.6 31.8 5.6 175.5 0.2 36.7	5.8 22.0 561.2 136.3 22.8 748.0 0.6 150.8	5.2 46.8 1789.4 694.0 61.6 2596.9 10.5 367.9		
Crash Type Multiple vehicle	Crash Type Cat Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehicle Crashes with animal: Crashes with fixed ob Crashes with other of	e crashes: le crashes: le crashes: oject:	70tal 12.6 74.9 2507.2 868.1 91.1 3553.8 11.3 562.4 86.3	0.1 0.3 6.6 1.6 0.3 8.8 0.0 1.8	A 0.2 0.7 18.5 4.5 0.8 24.6 0.0 5.2 0.4	B 1.4 5.1 131.6 31.8 5.6 175.5 0.2 36.7 2.6	5.8 22.0 561.2 136.3 22.8 748.0 0.6 150.8	5.2 46.8 1789.4 694.0 61.6 2596.9 10.5 367.9		
Crash Type Multiple vehicle	Crash Type Cat Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehicle Crashes with animal: Crashes with fixed ob Crashes with other of Crashes with parked	e crashes: le crashes: le crashes: oject: oject: vehicle:	70tal 12.6 74.9 2507.2 868.1 91.1 3553.8 11.3 562.4 86.3 11.1	0.1 0.3 6.6 1.6 0.3 8.8 0.0 1.8 0.1	0.2 0.7 18.5 4.5 0.8 24.6 0.0 5.2 0.4	B 1.4 5.1 131.6 31.8 5.6 175.5 0.2 36.7 2.6 0.7	5.8 22.0 561.2 136.3 22.8 748.0 0.6 150.8 11.2 2.9	5.2 46.8 1789.4 694.0 61.6 2596.9 10.5 367.9 72.0		
Crash Type Multiple vehicle	Crash Type Cat Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehicle Crashes with animal: Crashes with fixed ob Crashes with other of	e crashes: le crashes: le crashes: oject: oject: vehicle:	70tal 12.6 74.9 2507.2 868.1 91.1 3553.8 11.3 562.4 86.3	0.1 0.3 6.6 1.6 0.3 8.8 0.0 1.8	A 0.2 0.7 18.5 4.5 0.8 24.6 0.0 5.2 0.4	B 1.4 5.1 131.6 31.8 5.6 175.5 0.2 36.7 2.6	5.8 22.0 561.2 136.3 22.8 748.0 0.6 150.8 11.2 2.9	5.2 46.8 1789.4 694.0 61.6 2596.9 10.5 367.9		
Crash Type Multiple vehicle	Crash Type Cat Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicle Total multiple-vehicle Crashes with animal: Crashes with fixed ob Crashes with other of Crashes with parked	e crashes: le crashes: le crashes: oject: oject: vehicle: crashes	70tal 12.6 74.9 2507.2 868.1 91.1 3553.8 11.3 562.4 86.3 11.1	0.1 0.3 6.6 1.6 0.3 8.8 0.0 1.8 0.1	0.2 0.7 18.5 4.5 0.8 24.6 0.0 5.2 0.4	B 1.4 5.1 131.6 31.8 5.6 175.5 0.2 36.7 2.6 0.7	5.8 22.0 561.2 136.3 22.8 748.0 0.6 150.8 11.2 2.9	PDO 5.2 46.8 1789.4 694.0 61.6 2596.9 10.5 367.9 72.0 7.3		

	Evaluation Site Summary							
General In	formation				y			
Project des		I-495 From	MD 190 to I-270 West	Spur Phas	se 1 Build			
Analyst:		SMT		1/31/22		Area type:	Urban	
First year o	f analysis	2027	Total length of freeway				1.510	
Last year o		2045	Total long at or moona	y ooginionto	ioi otaay i	onou (m.).	1.010	
Site Descr		2010						
Freeway S	•							
Number	Lanes	Study Poriod	Study Period Descripti	ion				
Number	Lanes	Length (mi)	otudy i enod bescripti	1011				
1	9	0.010	GP MP 2.40 - MP 2.41					
2	10	0.160	GP MP 2.41 to MP 2.57					
3	10	0.030	GP MP 2.57 to MP 2.60					
4	10	1.080	GP MP 2.60 to MP 3.68					
5	10	0.230	GP MP 3.68 to MP 3.91					
	0							
6		0.000	0					
7	0	0.000	0					
8	0	0.000	0					
9	0	0.000	0					
10	0	0.000	0					
11	0	0.000	0					
12	0	0.000	0					
13	0	0.000	0					
14	0	0.000	0					
15	0	0.000	0					
16	0	0.000	0					
17	0	0.000	0					
18	0	0.000	0					
19	0 0	0.000	0					
20		0.000	0					
Ramp Seg		a al		Niconala a u	Chiralia Dani	- d		
Number	Study Period Description			Number	Study Perion Description			
1	•	om CJP NB to		21		p from I-495 SI		
2		om I-495 NB (22		from MD 190 to		
3		om I-495 NB 0		23	-	p from MD 190		
4	-	from CJP NB t		24		from MD 190 to		
5		p from CJP NE		25	-	p from MD 190		
6		om CJP NB to		26	0	p iioiii wib 100		
7		om I-495 NB I		27	0			
8	-	from I-495 NE		28	0			
9	-	om MD 190 to		29	0			
10	-	from MD 190 to		30	0			
11	-	om SB I-495 N		31	0			
12	-	om SB I-495 G		32	0			
13		from MD 190 t		33	0			
14	-	from MD 190 a		34	0			
15	-	from MD 190 a		35	0			
16	-	from MD 190 t		36	0			
17	-	from MD 190		37	0			
18		from I-495 SB		38	0			
19		p from I-495 SB		39	0			
20	T4-16 Ramp f			40	0			
	Ramp Ter		<u>I</u>		<u> ~ </u>			
Number	Config.		Study Period Descripti	ion				
1	D4	Signal	MD 190 at I-495 NB					
2	D4	Signal	MD 190 at I-495 NB					
3	0	0	0					
	0	0	0					
4								
4 5		0	0					
4 5 6	0	0 0	0					

		Out	put Summ	arv				
General Information				<i>y</i>				
Project description:	I-495 From MD 190 to	1-270 Wes	t Spur Pha	se 1 Build				
Analyst:	SMT		4/7/2022	oo i Balla	Area type:	Ti-	Urban	
First year of analysis:		Date.	7/1/2022		Alca type.		Orban	
Last year of analysis:								
Crash Data Descript				NI-	I =:	£ll-4		
Freeway segments	Segment crash data		_	No		of crash data		
	Project-level crash da		?	No		of crash data		
Ramp segments	Segment crash data			No	First year o	of crash data	a:	
	Project-level crash da	ita available	?	No	Last year of crash data:			
Ramp terminals	Segment crash data	available?		No	First year o	of crash data	a:	
	Project-level crash da	ıta available	?	No	Last year o	of crash data	a:	
Estimated Crash Sta	atistics							
Crashes for Entire F	acility		Total	К	Α	В	С	PDO
	es during Study Period, cra-	shes.	3161.2	8.4		191.4	784.2	2148.7
	eq. during Study Period, cra		166.4	0.4		10.1	41.3	113.1
Crashes by Facility		Nbr. Sites	Total	K	Α	В	C C	PDO
								_
Freeway segments, o		5	2481.0	6.7	18.7	133.4	541.1	1781.0
Ramp segments, cras		25	188.8	1.4		22.1	45.9	115.1
Crossroad ramp term	2	491.4	0.2	5.5	35.9	197.2	252.6	
Crashes for Entire F		Year	Total	K	Α	В	С	PDO
Estimated number of	0	2027	166.4	0.4		10.1	41.3	113.1
the Study Period, cra	shes:	2028	166.4	0.4	1.5	10.1	41.3	113.1
		2029	166.4	0.4	1.5	10.1	41.3	113.1
		2030	166.4	0.4	1.5	10.1	41.3	113.1
		2031	166.4	0.4	1.5	10.1	41.3	113.1
		2032	166.4	0.4		10.1	41.3	113.1
		2033	166.4	0.4		10.1	41.3	113.1
		2034	166.4	0.4	1.5	10.1	41.3	113.1
		2035	166.4	0.4		10.1	41.3	113.1
		2036	166.4	0.4		10.1	41.3	113.1
		2037	166.4	0.4		10.1	41.3	113.1
			166.4	0.4			41.3	
		2038			1.5	10.1		113.1
		2039	166.4	0.4		10.1	41.3	113.1
		2040	166.4	0.4		10.1	41.3	113.1
		2041	166.4	0.4		10.1	41.3	113.1
		2042	166.4	0.4		10.1	41.3	113.1
		2043	166.4	0.4	1.5	10.1	41.3	113.1
		2044	166.4	0.4	1.5	10.1	41.3	113.1
		2045	166.4	0.4	1.5	10.1	41.3	113.1
		2046						
		2047						
		2048						
		2049						
		2050						
Distribution of Cras	hes for Entire Facility				<u>i </u>			
			Fetima	ted Numb	er of Crach	es During	the Study	Period
Crash Type	Crash Type Cat	egory	Total	K	A	B	C	PDO
Multiple vehicle	Head-on crashes:		11.9	0.0		1.2	5.5	
iviulupie veriicie								4.9
	Right-angle crashes:		159.3	0.2		12.4	63.5	81.4
	Rear-end crashes:		1702.7	4.1	14.5	100.8	436.0	1147.2
	Sideswipe crashes:		532.7	1.0	2.9	20.4	84.1	424.3
	Other multiple-vehicle		62.0	0.2	0.6	3.9	15.2	42.1
	Total multiple-vehic	le crashes:	2468.6	5.5	20.0	138.7	604.3	1700.0
Single vehicle	Crashes with animal:		8.9	0.0		0.2	0.6	8.1
	Crashes with fixed ob	ject:	508.9	2.1	6.1	37.7	128.7	334.4
	Crashes with other of		61.3	0.1	0.3	2.0	7.7	51.1
	Crashes with parked		9.9	0.0		0.7	2.5	6.5
	Other single-vehicle		103.7	0.6		12.0	40.5	48.6
	Total single-vehicle		692.6	2.9		52.6	179.9	448.7
	Total crasl	IES.	3161.2	8.4	28.5	191.4	784.2	2148.7

	Evaluation Site Summary							
General In	formation							
Project des	cription:	I-495 MD F	rom I-270 West Spur to	o MD 187	Phase 1 Bu	ıild		
Analyst:		DK		1/31/22		Area type:	U	rban
First year o	f analysis:	2027	Total length of freeway		for Study F		1.710	
Last year o		2045		•	-			
Site Descr								
Freeway S								
Number	Lanes	Study Period	Study Period Descripti	on				
	2000	Length (mi)	John J. Green December					
1	6		GP MP 3.91 to MP 4.12					
2	7	0.480	GP MP 4.12 to MP 4.59					
3	6	0.820	GP MP 4.59 to MP 5.41					
4	6	0.050	GP MP 5.41 to MP 5.46					
5	6	0.150	GP MP 5.46 to MP 5.61					
6	0	0.000	0					
7	0	0.000	0					
8	0	0.000	0					
9	0	0.000	0					
10	0	0.000	0					
11	0	0.000	0					
12	0	0.000	0					
13	0	0.000	0					
13	0	0.000	0					
15	0	0.000	0					
16	0	0.000	0					
17	0	0.000	0					
18	0	0.000	0					
19	0	0.000	0					
20	0	0.000	0					
Ramp Seg	-	0.000	Į o			<u> </u>		
	Study Perio	nd		Number	Study Peri	od		
	Description			Nullibel	Description			
		om I-495 NB N		21	0	• •		
		om I-495 NB (22	0			
	0 -2 ramp ii			23	0			
	0			24	0			
	0			25	0			
	0			26	0			
	0			27	0			
8	0			28	0			
	0			29	0			
10	0			30	0			
	0			31	0			
	0			32	0			
13	0			33	0			
	0			34	0			
15	0			35	0			
	0			36	0			
	0			37	0			
	0			38	0			
	0			39	0			
	0			40	0			
	Ramp Ter	rminals						
Number	Config.		Study Period Descripti	on				
1	0	0	0					
2	0	0	0					
3	0	0	0					
4	0	0	0					
5	0	0	0					
6	0	0	0					

		Out	put Summ	ary				
General Information	1			<u>y</u>				
Project description:	I-495 MD From I-270) West Spur t	to MD 187	Phase 1 B	uild			
Analyst:	DK		4/7/2022		Area type:		Urban	
First year of analysis:		Date.	17172022		, aca type.	<u> </u>	<u> </u>	
Last year of analysis:								
Crash Data Descrip								
Freeway segments	Segment crash data	available?	1	No	First year	of crash data	o: 1	
Freeway segments		2						
Б (Project-level crash of		! ?	No		of crash data		
Ramp segments	Segment crash data		_	No	First year of crash data:			
	Project-level crash of		?	No	,	of crash data		
Ramp terminals	Segment crash data		_	No		of crash data		
	Project-level crash of	lata available	?	No	Last year c	of crash data	a:	
Estimated Crash St								
Crashes for Entire I	Facility		Total	K	Α	В	С	PDO
Estimated number of crash	nes during Study Period, cr	ashes:	1511.6	5.1	13.9	96.2	322.5	1073.9
Estimated average crash f	req. during Study Period, c	rashes/yr:	79.6	0.3	0.7	5.1	17.0	56.5
Crashes by Facility	Component	Nbr. Sites	Total	K	Α	В	С	PDO
Freeway segments, o		5	1481.4	4.8		92.3	316.2	1055.0
Ramp segments, cra		2	30.2	0.3		4.0	6.3	18.9
Crossroad ramp term		0	0.0	0.0		0.0	0.0	0.0
Crashes for Entire F		Year	Total	K	Α	B	C	PDO
Estimated number of		2027	79.6	0.3		5.1	17.0	56.5
the Study Period, cra	snes:	2028	79.6	0.3		5.1	17.0	56.5
		2029	79.6	0.3		5.1	17.0	56.5
		2030	79.6	0.3		5.1	17.0	56.5
		2031	79.6	0.3		5.1	17.0	56.5
		2032	79.6	0.3		5.1	17.0	56.5
		2033	79.6	0.3		5.1	17.0	56.5
		2034	79.6	0.3	0.7	5.1	17.0	56.5
		2035	79.6	0.3	0.7	5.1	17.0	56.5
		2036	79.6	0.3	0.7	5.1	17.0	56.5
		2037	79.6	0.3		5.1	17.0	56.5
		2038	79.6	0.3	0.7	5.1	17.0	56.5
		2039	79.6	0.3		5.1	17.0	56.5
		2040	79.6	0.3		5.1	17.0	56.5
		2041	79.6	0.3		5.1	17.0	56.5
		2041	79.6	0.3		5.1	17.0	56.5
		2042	79.6	0.3		5.1	17.0	56.5
		2044	79.6	0.3		5.1	17.0	56.5
		2045	79.6	0.3	0.7	5.1	17.0	56.5
		2046						
		2047						
		2048						
		2049						
		2050						
Distribution of Cras	hes for Entire Facili	ty						
Crook Turns	Cuach Time O	to a c w	Estima	ted Numb	er of Crash	nes During	the Study	Period
Crash Type	Crash Type Ca	itegory	Total	K	Α	В	С	PDO
Multiple vehicle	Head-on crashes:		4.1	0.0	0.1	0.5	1.8	1.7
,	Right-angle crashes	:	23.2	0.1		1.9	6.6	14.3
	Rear-end crashes:	-	801.3	2.7	7.3	51.2	174.9	565.2
	Sideswipe crashes:		264.2	0.7	1.8	12.7	43.2	205.8
	Other multiple-vehic	le craches:	28.3	0.7	0.3	2.0	6.9	19.0
Cimala l- : - l	Total multiple-vehi		1121.1	3.6		68.3	233.4	806.0
Single vehicle	Crashes with animal		6.1	0.0		0.1	0.3	5.7
	Crashes with fixed object:		285.0	1.1	3.0	20.2	64.4	196.4
g							4.0	047
g s.s	Crashes with other of	object:	40.9	0.1	0.2	1.4	4.6	34.7
g .	Crashes with other of Crashes with parked	object: I vehicle:	4.9	0.0	0.1	0.4	1.1	3.4
g.:	Crashes with other of	object: I vehicle:		0.0	0.1 0.9			
g .	Crashes with other of Crashes with parked	bject: I vehicle: crashes	4.9	0.0	0.1 0.9	0.4	1.1	3.4

Evaluation Site Summary								
General In	formation				,			
Project des		I-495 MD F	rom MD 187 To MD 3	55/I-495				
Analyst:		DK		1/31/22		Area type:	Tı	Jrban
First year o		2027	Total length of freeway		for Study F		1.450	
Last year o		2045	i star longar or nocwa	, Joginonia	ioi oluuy I	5110G (1111).	1.400	
Site Descr		2040						
Freeway S		Otrodo D. I. I	Study Daried Descript	ion				
Number	Lanes	-	Study Period Descripti	ion				
		Length (mi)						
1	6	0.130	GP MP 5.61 to MP 5.74					
2	6	0.060	GP MP 5.74 to MP 5.80					
3	6	0.490	GP MP 5.80 to MP 6.29					
4	5	0.180	GP MP 6.29 - MP 6.47					
5	5	0.030	GP MP 6.47 to MP 6.50					
6	8	0.250	GP MP 6.50 - MP 6.75					
7	9	0.030	GP MP 6.75 - MP 6.78					
8	9	0.070	GP MP 6.78 - MP 6.85					
9	9	0.210	GP MP 6.85 - MP 7.06					
10	0	0.000	0					
11	0	0.000	0					
12								
	0	0.000	0					
13	0	0.000	0					
14	0	0.000	0					
15	0	0.000	0					
16	0	0.000	0					
17	0	0.000	0					
18	0	0.000	0					
19	0	0.000	0					
20	0	0.000	0					
Ramp Seg								
	Study Perio	od		Number	Study Peri	od		
	Description				Description			
		om I-495 WB 1		21	0			
	-	om MD 187 N		22	0			
		om I-495 EB to		23	0			
		om MD 187 to		24	0			
_	-	p from MD 355		25	0			
_		p from I-270 S		26	0			
		p iioiii i-270 S oop to I-270 N		27	0			
_		oop to I-270 N		28	0			
_		-		29	0			
		495 Inner Loop						
		NB to I-495 O		30	0			
		uter Loop to M		31	0			
		NB to I-495 In		32	0			
		SB to I-495 In		33	0			
		Inner Loop to I		34	0			
	G6-9.2 I-495 I	Inner Loop to I		35	0			
16	0			36	0			
17	0			37	0			
18	0			38	0			
	0			39	0			
	0			40	0			
	Ramp Ter	minals	•	•	•			
Number	Config.		Study Period Descripti	ion				
1	D4	Signal	MD 187 at I-495 WB					
2	D4	Signal	MD 187 at I-495 EB					
3	0	0	0					
4	0	0	0					
5	0	0	0					
6	0	0	0					
)	U	U	 ∼			ļ		

		Out	tput Summa	ary				
General Information								
Project description:	I-495 MD From MD 1	87 To MD 35	55/I-495					
Analyst:	DK	Date:	1/31/22		Area type:	l	Jrban	
First year of analysis:	2027				, ,,			
Last year of analysis:								
Crash Data Descript								
Freeway segments	Segment crash data	available?		No	First year o	f crash data		
roomay cogmonic	Project-level crash d)	No	,	f crash data:		
Ramp segments	Segment crash data			No	First year of crash data:			
rtamp segments	Project-level crash d)	No	Last year of crash data:			
Ramp terminals	Segment crash data		+	No		f crash data		
Namp terminais	Project-level crash d		,	No		f crash data:		
Estimated Crash Sta	,	ala avallable :	<u> </u>	INU	Last year o	i ciasii uata.	·	
			Total	1/	Α	В	С	DDO
Crashes for Entire F	•		Total	K	A	В	_	PDO
	es during Study Period, cra		2964.8	8.5	39.6	243.4	920.3	1753.1
	req. during Study Period, cra	shes/yr:	156.0	0.4	2.1	12.8	48.4	92.3
Crashes by Facility	Component	Nbr. Sites	Total	K	Α	В	С	PDO
Freeway segments, o	rashes:	9	1650.1	4.8	13.2	93.0	362.6	1176.6
Ramp segments, cras	shes:	15	287.3	3.0	9.1	47.1	89.9	138.2
Crossroad ramp term	inals, crashes:	2	1027.5	0.7	17.3	103.3	467.9	438.3
Crashes for Entire F	· · · · · · · · · · · · · · · · · · ·	Year	Total	K	Α	В	С	PDO
Estimated number of		2027	156.0	0.4	2.1	12.8	48.4	92.3
the Study Period, cra	•	2028	156.0	0.4	2.1	12.8	48.4	92.3
Judy i oliou, ola		2029	156.0	0.4	2.1	12.8	48.4	92.3
		2029	156.0	0.4	2.1	12.8	48.4	92.3
		2030	156.0	0.4	2.1	12.8	48.4	92.3
		2032	156.0	0.4	2.1	12.8	48.4	92.3
		2032	156.0		2.1	12.8	48.4	92.3
		2033	156.0	0.4 0.4	2.1	12.8	48.4	92.3
							-	
		2035	156.0	0.4	2.1	12.8	48.4	92.3
		2036	156.0	0.4	2.1	12.8	48.4	92.3
		2037	156.0	0.4	2.1	12.8	48.4	92.3
		2038	156.0	0.4	2.1	12.8	48.4	92.3
		2039	156.0	0.4	2.1	12.8	48.4	92.3
		2040	156.0	0.4	2.1	12.8	48.4	92.3
		2041	156.0	0.4	2.1	12.8	48.4	92.3
		2042	156.0	0.4	2.1	12.8	48.4	92.3
		2043	156.0	0.4	2.1	12.8	48.4	92.3
		2044	156.0	0.4	2.1	12.8	48.4	92.3
		2045	156.0	0.4	2.1	12.8	48.4	92.3
		2046						
		2047						
		2048	+		1			
		2049						
		2050						
Distribution of Cras	hes for Entire Facility				1			
Pisainaaasii oi cias	ioi Enuit i aciiil)	<u>'</u>	Fetima	tad Numb	or of Crach	es During t	he Study E	Pariod
	Crach Type Category		∟əuiiid	iga Nallib	or or orașii			
Crash Type	Crash Type Ca	itegory			٨	D	, ,	ייוט
	1	tegory	Total	K	Α 0.3	B 2.1	C 0 1	PDO
	Head-on crashes:		Total 16.2	K 0.1	0.3	2.1	8.1	5.6
	Head-on crashes: Right-angle crashes:		Total 16.2 278.5	0.1 0.3	0.3 4.8	2.1 29.2	8.1 130.1	5.6 114.2
	Head-on crashes: Right-angle crashes: Rear-end crashes:		Total 16.2 278.5 1642.5	0.1 0.3 4.4	0.3 4.8 22.3	2.1 29.2 138.4	8.1 130.1 541.9	5.6 114.2 935.4
	Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes:		Total 16.2 278.5 1642.5 452.9	0.1 0.3 4.4 0.9	0.3 4.8 22.3 3.3	2.1 29.2 138.4 21.1	8.1 130.1 541.9 77.9	5.6 114.2 935.4 349.6
	Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicl	e crashes:	Total 16.2 278.5 1642.5 452.9 68.3	0.1 0.3 4.4 0.9 0.4	0.3 4.8 22.3 3.3 1.2	2.1 29.2 138.4 21.1 7.2	8.1 130.1 541.9 77.9 20.9	5.6 114.2 935.4 349.6 38.6
	Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes:	e crashes:	Total 16.2 278.5 1642.5 452.9 68.3 2458.4	0.1 0.3 4.4 0.9	0.3 4.8 22.3 3.3	2.1 29.2 138.4 21.1	8.1 130.1 541.9 77.9	5.6 114.2 935.4 349.6
	Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicl	e crashes:	Total 16.2 278.5 1642.5 452.9 68.3	0.1 0.3 4.4 0.9 0.4	0.3 4.8 22.3 3.3 1.2	2.1 29.2 138.4 21.1 7.2	8.1 130.1 541.9 77.9 20.9	5.6 114.2 935.4 349.6 38.6 1443.4
Multiple vehicle	Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicl Total multiple-vehic	e crashes:	Total 16.2 278.5 1642.5 452.9 68.3 2458.4	0.1 0.3 4.4 0.9 0.4 6.1	0.3 4.8 22.3 3.3 1.2 32.0	2.1 29.2 138.4 21.1 7.2 197.9	8.1 130.1 541.9 77.9 20.9 779.0	5.6 114.2 935.4 349.6 38.6 1443.4
Multiple vehicle	Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicl Total multiple-vehicl Crashes with animal: Crashes with fixed ol	e crashes: cle crashes:	Total 16.2 278.5 1642.5 452.9 68.3 2458.4 5.3 369.2	0.1 0.3 4.4 0.9 0.4 6.1 0.0	0.3 4.8 22.3 3.3 1.2 32.0 0.0	2.1 29.2 138.4 21.1 7.2 197.9	8.1 130.1 541.9 77.9 20.9 779.0 0.3	5.6 114.2 935.4 349.6 38.6 1443.4 4.8 231.4
Multiple vehicle	Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicl Total multiple-vehicl Crashes with animal: Crashes with fixed of Crashes with other of	e crashes: cle crashes: oject: bject:	Total 16.2 278.5 1642.5 452.9 68.3 2458.4 5.3 369.2 43.9	0.1 0.3 4.4 0.9 0.4 6.1 0.0 1.7	0.3 4.8 22.3 3.3 1.2 32.0 0.0 5.3	2.1 29.2 138.4 21.1 7.2 197.9 0.1 32.1	8.1 130.1 541.9 77.9 20.9 779.0 0.3 98.8 5.9	5.6 114.2 935.4 349.6 38.6 1443.4 4.8
Multiple vehicle	Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicl Total multiple-vehicl Crashes with animal: Crashes with fixed of Crashes with other of Crashes with parked	e crashes: cle crashes: oject: bject: vehicle:	Total 16.2 278.5 1642.5 452.9 68.3 2458.4 5.3 369.2 43.9 7.5	0.1 0.3 4.4 0.9 0.4 6.1 0.0 1.7 0.1	0.3 4.8 22.3 3.3 1.2 32.0 0.0 5.3 0.3	2.1 29.2 138.4 21.1 7.2 197.9 0.1 32.1 1.7 0.6	8.1 130.1 541.9 77.9 20.9 779.0 0.3 98.8 5.9 2.0	5.6 114.2 935.4 349.6 38.6 1443.4 4.8 231.4 35.9
Multiple vehicle	Head-on crashes: Right-angle crashes: Rear-end crashes: Sideswipe crashes: Other multiple-vehicl Total multiple-vehicl Crashes with animal: Crashes with fixed of Crashes with other of	e crashes: cle crashes: bject: bject: vehicle: crashes	Total 16.2 278.5 1642.5 452.9 68.3 2458.4 5.3 369.2 43.9	0.1 0.3 4.4 0.9 0.4 6.1 0.0 1.7	0.3 4.8 22.3 3.3 1.2 32.0 0.0 5.3 0.3 0.1	2.1 29.2 138.4 21.1 7.2 197.9 0.1 32.1 1.7	8.1 130.1 541.9 77.9 20.9 779.0 0.3 98.8 5.9	5.6 114.2 935.4 349.6 38.6 1443.4 4.8 231.4 35.9

Evaluation Site Summary								
General In	formation		2.01001					
Project des		GWMP at	-495					
Analyst:	-	DK		1/31/22		Area type:	Urban	
First year o	of analysis:	2027	Total length of freeway		for Study F	Period (mi):	0.230	
Last year o		2045	, i		,	,		
Site Descr								
Freeway S								
Number	Lanes	Study Period	Study Period Descripti	on				
		Length (mi)						
1	4	0.230	GWMP GP 1					
2	0	0.000	0					
3	0	0.000	0					
4	0	0.000	0					
5	0	0.000	0					
6	0	0.000	0					
7	0	0.000	0					
8	0	0.000	0					
9	0	0.000	0					
10	0	0.000	0					
11	0	0.000	0					
12	0	0.000	0					
13	0	0.000	0					
14	0	0.000	0					
15	0	0.000	0					
16 17	0	0.000	0					
17	0 0	0.000 0.000	0					
19	0	0.000	0					
20	0	0.000	0					
Ramp Seg		0.000	<u> </u>					
	Study Perio	od		Number	Study Peri	od		
	Description				Description			
	0			21	0			
	0			22	0			
	0			23	0			
	0			24	0			
	0			25	0			
	0			26	0			
	0			27	0			
	0			28	0			
	0			29 30	0			
	0 0			30	0			
	0			32	0			
	0			33	0			
	0			34	0			
	0			35	0			
	0			36	0			
	0			37	0			
	0			38	0			
19	0			39	0			
20	0			40	0			
Crossroad	Ramp Ter							
Number	Config.	Control	Study Period Descripti	on				
1	0	0	0					
2	0	0	0					
3	0	0	0					
4	0	0	0					
5	0	0	0					
6	0	0	0					

			Out	tput Summa	ary				
General Information									
Project description:	GWMP at I-	495							
Analyst:				1/31/22		Area type:		Urban	
First year of analysis:	2027		,			, ,,			
Last year of analysis:	2045								
Crash Data Descript									
Freeway segments	Segment cr	ach data a	vailable?		No	First year o	of crash data	·	
i reeway segments				2	No	,			
D	Project-leve					Last year of crash data: First year of crash data:			
Ramp segments	Segment cr				No				
	Project-level crash data available?					Last year of crash data:			
Ramp terminals	Segment cr				No		of crash data		
	Project-leve	el crash da	ta available'	?	No	Last year o	f crash data	1:	
Estimated Crash Sta									
Crashes for Entire F	acility			Total	K	Α	В	С	PDO
Estimated number of crash-	es during Study	Period, crast	nes:	57.1	0.5	0.9	6.7	11.7	37.3
Estimated average crash fr	eq. during Study	Period, cras	hes/yr:	3.0	0.0	0.0	0.4	0.6	2.0
Crashes by Facility			Nbr. Sites	Total	K	Α	В	С	PDO
Freeway segments, c			1	57.1	0.5		6.7	11.7	37.3
Ramp segments, cras			0	0.0	0.0		0.0	0.0	0.0
Crossroad ramp termi		e·	0	0.0	0.0		0.0	0.0	0.0
			ŭ				B	C	PDO
Crashes for Entire F	<u> </u>		Year	Total	K	Α			
Estimated number of		ng	2027	3.0	0.0		0.4	0.6	2.0
the Study Period, cras	snes:		2028	3.0	0.0		0.4	0.6	2.0
			2029	3.0	0.0		0.4	0.6	2.0
			2030	3.0	0.0	0.0	0.4	0.6	2.0
			2031	3.0	0.0	0.0	0.4	0.6	2.0
			2032	3.0	0.0	0.0	0.4	0.6	2.0
			2033	3.0	0.0	0.0	0.4	0.6	2.0
		2034	3.0	0.0	0.0	0.4	0.6	2.0	
		2035	3.0	0.0	0.0	0.4	0.6	2.0	
		2036	3.0	0.0	0.0	0.4	0.6	2.0	
			2037	3.0	0.0		0.4	0.6	2.0
			2038	3.0	0.0		0.4	0.6	2.0
			2039	3.0	0.0		0.4	0.6	2.0
			2040	3.0	0.0	0.0	0.4	0.6	2.0
			2041	3.0	0.0	0.0	0.4	0.6	2.0
			2042	3.0	0.0		0.4	0.6	2.0
			2043	3.0	0.0		0.4	0.6	2.0
			2044	3.0	0.0		0.4	0.6	2.0
			2045	3.0	0.0	0.0	0.4	0.6	2.0
			2046						
			2047						
			2048						
			2049						
			2050						
Distribution of Crasi	hes for Entir	e Facility		•				<u>'</u>	
		_		Estima	ted Numb	er of Crash	nes During	the Study F	Period
Crash Type	Crash	Type Cat	egory	Total	K	Α	В	С	PDO
Multiple vehicle	Head-on cra	ashes:		0.1	0.0		0.0	0.0	0.0
ividitiple verificie	Right-angle crashes:		0.8	0.0		0.1	0.2	0.4	
	Rear-end crashes:		24.0	0.0	0.0	2.9	5.0	15.5	
	Sideswipe crashes:		8.8	0.2	0.4	0.7	1.2	6.8	
	Oth 10	Other multiple-vehicle crashes:		0.8	0.0	0.0	0.1	0.2	0.5
						0.5	3.8	6.7	23.2
	Total mult	tiple-vehicl	e crashes:	34.4	0.3				
Single vehicle	Total mult	tiple-vehicl th animal:		0.3	0.0	0.0	0.0	0.0	0.3
Single vehicle	Total mult Crashes wit Crashes wit	tiple-vehicl th animal: th fixed ob	ject:	0.3 16.1	0.0 0.1	0.0 0.3	0.0 2.0	0.0 3.6	0.3 10.0
Single vehicle	Total mult Crashes wit Crashes wit Crashes wit	tiple-vehicl th animal: th fixed ob th other ob	ject: ject:	0.3 16.1 2.6	0.0 0.1 0.0	0.0 0.3 0.0	0.0 2.0 0.2	0.0 3.6 0.3	0.3 10.0 2.1
Single vehicle	Total mult Crashes wit Crashes wit	tiple-vehicl th animal: th fixed ob th other ob	ject: ject:	0.3 16.1	0.0 0.1	0.0 0.3 0.0	0.0 2.0	0.0 3.6	0.3 10.0 2.1 0.2
Single vehicle	Total mult Crashes wit Crashes wit Crashes wit	tiple-vehicl th animal: th fixed ob th other ob th parked v	iect: ject: /ehicle:	0.3 16.1 2.6	0.0 0.1 0.0	0.0 0.3 0.0 0.0	0.0 2.0 0.2	0.0 3.6 0.3	0.3 10.0 2.1
Single vehicle	Total mult Crashes wit Crashes wit Crashes wit Crashes wit Other single	tiple-vehicl th animal: th fixed ob th other ob th parked v	iect: ject: vehicle: rashes	0.3 16.1 2.6 0.4	0.0 0.1 0.0 0.0	0.0 0.3 0.0 0.0 0.1	0.0 2.0 0.2 0.0	0.0 3.6 0.3 0.1	0.3 10.0 2.1 0.2

			Evaluat	tion Site S	ımmarv				
Evaluation Site Summary General Information									
	Project description: From I-370 to Fields Road to Merge/Diverge From I-270 Ramps								
Analyst:		DK		1/31/22		Area type:	Urban		
First year o		2027	Total length of freeway		for Study F		1.221		
Last year o		2045	, ,		,	()			
Site Descr									
Freeway S	•								
Number	Lanes	Study Period	Study Period Descripti	on					
		Length (mi)							
1	6	0.018	GP MP 0.25 - MP 0.27						
2	6	0.169	GP MP 0.27 - MP 0.44						
3	5	0.021	GP MP 0.44 - MP 0.46						
4	5	0.019	GP MP 0.46 - MP 0.48						
5	5	0.010	GP MP 0.48- MP 0.49						
6	5	0.145	GP MP 0.49 - MP 0.63						
7	5	0.116	GP MP 0.63 - MP 0.75						
8	4	0.175	GP MP 0.75 - MP 0.93						
9	5	0.024	GP MP 0.93 - MP 0.95						
10	5	0.235	GP MP 0.95 - MP 1.19						
11	5	0.013	GP MP 1.19 - MP 1.20						
12	6	0.010	GP MP 1.20 - MP 1.21						
13	7	0.265	GP MP 1.21 - MP 1.47						
14	0	0.000	0						
15	0		0						
16	0	0.000	0						
17	0	0.000	0						
18	0	0.000	0						
19 20	0 0	0.000 0.000	0						
Ramp Seg		0.000	0						
	Study Perio	nd .		Number	Study Peri	od			
	Description			Number	Description				
		370 WB to Wa		21	0				
	Ramp from W			22	0				
3	-	elds Rd/Sam I		23	0				
4	Ramp from W	ashingtonian l		24	0				
5	NB CD MP 0.	75 - MP 0.84		25	0				
6	NB CD MP 0.	84 - MP 0.95		26	0				
7	0			27	0				
	0			28	0				
	0			29	0				
	0			30	0				
	0			31	0				
	0 0			32 33	0				
	0			33 34	0				
					0				
	0 0			35 36	0				
	0			36 37	0				
	0			37 38	0				
	0			39	0				
20	0			40	0				
	Ramp Ter	minals	ı		1				
Number	Config.	Control	Study Period Descripti	on					
1	D4	Signal	Washingtonian Blvd at I-370	WB					
2	D4	_	Washingtonian Blvd at I-370						
3	0	0	0						
4	0	0	0						
5	0	0	0						
6	0	0	0						

		Out	put Summa	ary				
General Information	1			,				
Project description:	From I-370 to Fiel	ds Road to Merc	ae/Diverae F	rom I-270	Ramps			
Analyst:	DK		1/31/22		Area type:	I	Urban	
First year of analysis	: 2027	[=	.,					
Last year of analysis								
Crash Data Descrip								
Freeway segments	Segment crash da	ata available?	T	No	First year of	f crash data	. 1	
Freeway segments			,		,			
D	Project-level crash		·	No	Last year of			
Ramp segments	Segment crash da			No No No	First year of crash data:			
	Project-level crasi		<u>'</u>		Last year of			
Ramp terminals	Segment crash da				First year of crash data:			
	Project-level crash	n data available?	?	No	Last year of crash data:			
Estimated Crash St	atistics							
Crashes for Entire I	Facility		Total	K	Α	В	С	PDO
Estimated number of crash	nes during Study Period,	crashes:	477.3	2.5	7.8	45.6	108.1	313.2
Estimated average crash f	reg. during Study Period	, crashes/yr:	25.1	0.1	0.4	2.4	5.7	16.5
Crashes by Facility	, ,	Nbr. Sites	Total	K	Α	В	С	PDO
Freeway segments, of		13	322.8	2.2		34.2	67.8	212.9
Ramp segments, cra		6	31.8	0.3		4.1	6.9	19.8
Crossroad ramp term		2	122.6	0.0		7.4	33.4	80.6
	,		_					
Crashes for Entire		Year	Total	K	Α 0.4	В	C	PDO
Estimated number of	0	2027	25.1	0.1		2.4	5.7	16.5
the Study Period, cra	ishes:	2028	25.1	0.1	0.4	2.4	5.7	16.5
		2029	25.1	0.1	0.4	2.4	5.7	16.5
		2030	25.1	0.1	0.4	2.4	5.7	16.5
		2031	25.1	0.1	0.4	2.4	5.7	16.5
		2032	25.1	0.1	0.4	2.4	5.7	16.5
		2033	25.1	0.1	0.4	2.4	5.7	16.5
		2034	25.1	0.1	0.4	2.4	5.7	16.5
		2035	25.1	0.1	0.4	2.4	5.7	16.5
		2036	25.1	0.1	0.4	2.4	5.7	16.5
		2037	25.1	0.1	0.4	2.4	5.7	16.5
		2038	25.1	0.1	0.4	2.4	5.7	16.5
		2039	25.1	0.1	0.4	2.4	5.7	16.5
		2040	25.1	0.1	0.4	2.4	5.7	16.5
		2041 2042	25.1	0.1	0.4	2.4	5.7 5.7	16.5
			25.1	0.1	0.4			16.5
		2043	25.1	0.1	0.4	2.4	5.7	16.5
		2044	25.1	0.1	0.4	2.4	5.7	16.5
		2045	25.1	0.1	0.4	2.4	5.7	16.5
		2046						
		2047						
		2048						
		2049						
		2050						
Distribution of Cras	hes for Entire Fac	ility						
Crook Turns	Crack Torre	Cotomorri	Estima	ted Numb	er of Crash	es During t	he Study F	Period
Crash Type	Crash Type	Category	Total	K	Α	В	С	PDO
Multiple vehicle	Head-on crashes:		1.9	0.0	0.0	0.2	0.7	0.9
manipo vemee	Right-angle crashes:		33.0	0.0		2.5	9.8	20.3
	Rear-end crashes:		227.1	1.1		20.9	54.1	147.6
	Sideswipe crashes:		67.1	0.3		4.4	9.7	52.1
							_	
	Other multiple-vehicle crashes:		8.4	0.0		0.8	1.7	5.7
0	Total multiple-vehicle crashes:		337.6	1.5		28.7	75.9	226.7
Single vehicle	Crashes with animal:		1.7	0.0		0.0	0.1	1.6
=	Crashes with fixed object:		102.0	0.8		12.1	22.9	64.1
	Crashes with other object:		13.3	0.1	0.1	8.0	1.6	10.8
	Crashes with park	ed vehicle:	1.9	0.0		0.2	0.4	1.2
	Crashes with park Other single-vehic	ced vehicle: cle crashes	1.9 20.8	0.0	0.7	3.8	7.2	8.9
	Crashes with park Other single-vehic Total single-veh	ced vehicle: cle crashes	1.9	0.0				

Safety Performance Function for Managed Lanes VDOT Memo on the Development of Safety Performance Functions (SPFs) for I-495 Express Lanes

MEMORANDUM

To: Abi Lerner, P.E., VDOT Project Manager

From: Warren E. Hughes, P.E., ATCS, P.L.C.

Ram Jagannathan, ATCS, P.L.C. Rob Prunty, P.E., Kimley-Horn

Date: March 25, 2019

Subject: Development of Safety Performance Functions (SPFs) for I-495 Express Lanes

Introduction

This memorandum documents the development a new Safety Performance Functions (SPFs) for Express Lanes that was conducted as part of the I-495 Express Lanes Northern Extension Project. The methodology followed the framework that had been proposed in the memo dated November 15, 2018, which was submitted to and accepted by FHWA and VDOT.

Framework and Methodology for the Development of SPFs and Crash Prediction for Express Lanes

Treatment of Freeway Segments:

The Highway Safety Manual (HSM), first edition, does not have a crash prediction methodology for estimating the safety performance of separated express lanes or urban interstate corridors with express lanes/managed lane facilities. At the time that safety analyses were conducted for I-495 and for I-66, there was insufficient experience with express lanes in Virginia to properly predict crashes for express lanes. During the conduct of the I-495 Express Lanes Northern Extension study, it was proposed to VDOT and FHWA that sufficient crash history associated with express lanes on I-495 (the Capital Beltway) and that SPFs could be developed to help predict the expected crashes on both existing and new express lanes. With the development and application of SPF for express lanes, a more complete assessment could be performed for the safety performance of both the no-build and build alternatives related to extending the I-495 Express Lanes north to the American Legion Memorial Bridge. Using historical and available crash data, traffic volume data and roadway geometric data for the existing segments of I-495 Express Lanes, a SPF was developed. The SPFs will allow for estimation of future year crash experience for both existing express lane sections on I-495 and for new express lane sections that will be included in the Build alternative.

The study area includes approximately 3.5 miles along I-495 between the Route 123 interchange and the Maryland state line at the American Legion Memorial Bridge. The study area also extends approximately 2,500 feet east along the George Washington Memorial Parkway. Intersecting roadways and interchanges are also included in the study area, as well as adjacent areas within 600 feet of the existing edge of pavement, as shown in Figure 1. The Express Lanes extension is shown in Figure 2.

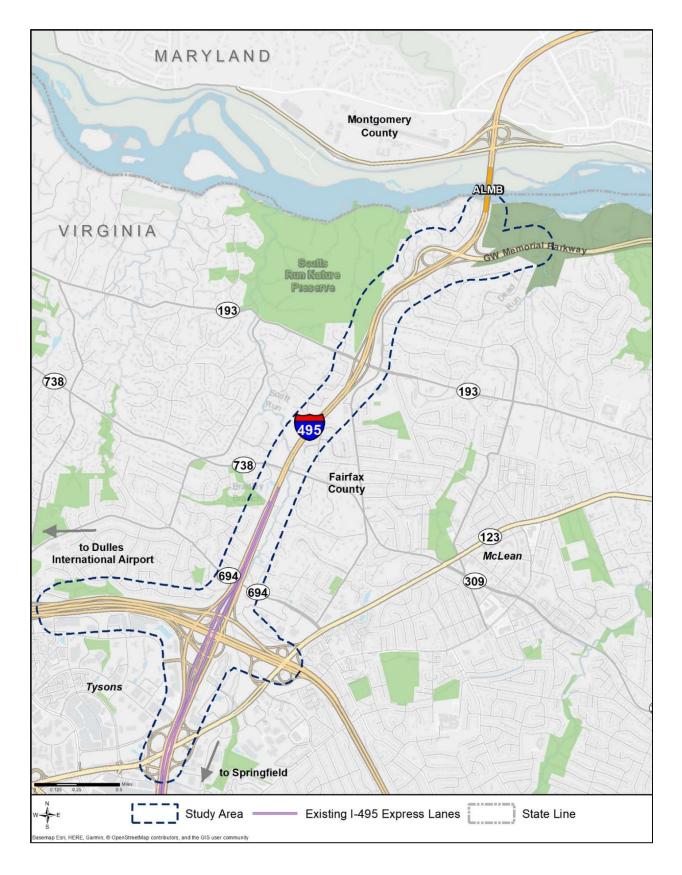


Figure 1: Express Lanes Northern Extension Study Area

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Figure 2: I-495 Express Lanes Northern Extension (from Transurban Public Information Meeting, March 2018)

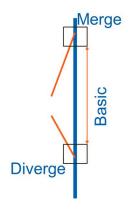
The construct of the safety performance prediction model was initially established to separate express lanes sections into one of three component parts, as shown below:

The Segmentation of express lanes includes: Basic Section (BS), which were between merge and diverge areas, Diverge Section (DS), which included 500 feet upstream and downstream of the diverge point, and Merge Section (MS), which included 500 feet upstream and downstream of the merge point. These are shown in the figure to the right side.

Based on this approach to segmentation, the sample size used in the development of the SPF for express lanes included the following:

For Northbound Express Lanes segments:

- 1. BS From the Southern NB Entrance to the on-ramp from Braddock Road
- 2. BS From the on-ramp from Braddock Rd to the on-ramp from Gallows Road
- 3. BS From the on-ramp from Gallows Road to the off-ramp to Lee Highway
- 4. BS From the off-ramp to Lee Hwy to the off-ramp to I-66
- 5. BS From the off-ramp to I-66 to the on-ramp from I-66 EB
- 6. BS From the on-ramp from I-66 EB to the off-ramp to Leesburg Pike (VA Rte. 7)
- 7. BS From the off-ramp to Leesburg Pike (VA Rte. 7) to the off-ramp to Westpark Drive Connector



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- BS From the off-ramp to Westpark Drive Connector to the on-ramp from Westpark Drive Connector
- 9. BS From the on-ramp from Westpark Drive Connector to the off-ramp to Jones Branch Connector
- 10. BS From the off-ramp to Jones Branch Connector to the off-ramp to VA Rte. 267
- 11. BS From the off-ramp to VA Rte. 267 to the on-ramp from Jones Branch Connector
- 12. BS From on-ramp from Jones Branch Connector to Northern NB Exit to GP Lane
- 13. DS off-ramp to Lee Highway
- 14. DS off-ramp to I-66
- 15. DS off-ramp to Leesburg Pike (VA Rte. 7)
- 16. DS off-ramp to Westpark Drive Connector
- 17. DS off-ramp to Jones Branch Connector
- 18. DS off-ramp to VA Rte. 267
- 19. MS on-ramp from Braddock Road
- 20. MS on-ramp from Gallows Road
- 21. MS on-ramp from I-66 EB
- 22. MS on-ramp from Westpark Drive Connector
- 23. MS on-ramp from Jones Branch Connector

For Southbound Express Lanes segments:

- 1. BS From Northern SB Entrance to the off-ramp to VA Rte. 267
- 2. BS From the off-ramp to VA Rte. 267 to off-ramp to Jones Branch Connector
- 3. BS From the off-ramp to Jones Branch Connector to the on-ramp from Jones Branch Connector
- 4. BS From On-Ramp from Jones Branch Connector and On-Ramp from VA Rte. 267
- 5. BS From the on-ramp from VA Rte. 267 to the off-ramp to Westpark Drive Connector
- 6. BS From the off-ramp to Westpark Drive Connector to the on-ramp from Westpark Drive Connector
- 7. BS From the on-ramp from Westpark Drive Connector to the on-ramp from Leesburg Pike (VA Rte. 7)
- 8. BS From the on-ramp from Leesburg Pike (VA Rte. 7) to the off-ramp from I-66 WB
- 9. BS From the off-ramp from I-66 WB to the on-ramp from I-66 WB & EB
- 10. BS From the on-ramp from I-66 WB and EB to the on-ramp from Lee Highway
- 11. BS From the on-ramp from Lee Highway to the off-ramp to Gallows Road
- 12. BS From the off-ramp to Gallows Road to the off-ramp to Braddock Road
- 13. BS From the off-ramp to Braddock Road to the Southern SB Exit
- 14. DS off-ramp to VA Rte. 267
- 15. DS off-ramp to Jones Branch Connector
- 16. DS off-ramp to Westpark Drive Connector
- 17. DS off-ramp from I-66 WB
- 18. DS off-ramp to Gallows Road
- 19. DS off-ramp to Braddock Road
- 20. MS on-ramp from Jones Branch Connector
- 21. MS on-ramp from VA Rte. 267
- 22. MS on-ramp from Westpark Drive Connector
- 23. MS On-ramp from Leesburg Pike (VA Rte. 7)
- 24. MS on-ramp from I-66 WB & EB
- 25. MS on-ramp from Lee Highway

It is important to note that in the development of the Safety Performance Function, the transition areas at the end of the express lanes and the ramps to/from the express lanes were excluded from the analysis. More detail on why this was done is provided in the succeeding paragraphs.

Treatment of Endings of Express Lanes:

August 2022

Based on INRIX and other travel time/speed observations, free flow conditions do not always exist at the downstream ends of express lanes where drivers coming from the express lanes must merge with

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Appendix K

adjacent traffic traveling in the general purpose (GP) lanes. Frequently, congestion occurs in this transition area due to downstream capacity limitations. Consequently, the transition zones do not operate as well as the upstream sections of the express lanes. To properly account for this, it is necessary to segregate the transition from the express lanes for the purposes of development of a SPF for express lanes. A line is needed to demark the end of the free flow, higher speed travel on express lanes and the beginning of the point where flow on express lanes is affected by downstream congestion and capacity-limitations associated with the GP lanes. Beyond the demarcation lines, ISATe is appropriate to analyze the sections of the Express Lanes that are no longer operating under free flow conditions.

Treatment of Ramps to/from Express Lanes:

No SPFs were developed for individual ramps to or from the express lanes. There were relatively few crashes reported on the ramps to/from the express lanes. Most of the crashes that occurred within the vicinity of the express lane ramps are reported in/near merges and diverges. As noted in the methodology memo, ISATe will be used to analyze the safety of express lane (EL) ramps. This will be in a manner similar to how ISATe is used to analyze ramps to and from the general purpose (GP) lanes. Consequently, ISATe procedures will be used for all EL and GP ramps for the 2025 and 2045 No-Build and Build alternatives.

Development of Safety Performance Functions for Express Lanes

In developing the safety performance functions, it is important to recognize the underlying assumptions on which the new relationships were based. These included the following:

- Because I-495 ELs operate within an uncongested regime, SPFs would be directly related to AADT as a dependent variable within certain thresholds.
- Traffic Volumes and Crash History for Existing I-495 Express Lane sections for the past 5 years (Jan. 1, 2013 through Dec. 31, 2017) were deemed adequate from a historical perspective and used to develop new SPFs for the express lanes directional segments consisting of two lanes.

The salient features of the crash data, from which the SPF were developed, are described as follows:

- A total of 396 crashes were reported over a period of 5 years on the I-495 express lanes.
- Of those 396 reported crashes, 49 reported crashes occurred within the Diverge Segments and 45 reported crashes occurred within the Merge Segments. The remaining 302 reported crashes occurred on the Basic and Weave Segments.

A series of statistical models were developed to predict crashes. The primary independent variables used in the regression analyses were AADT, segment length and segment type (Merge, Diverge or Basic/Weave). The number of predicted crashes per year was the dependent variable in each model. The following functional forms for SPFs were tested:

Group 1 (Each model included segment length as one of the independent variables):

- 1. All reported crashes as a function of AADT, segment length and segment type
- 2. All reported crashes as a function of AADT and segment length
- 3. Basic and weave segment crashes as a function of AADT and segment length
- 4. Merge segment crashes as a function of AADT and segment length
- 5. Diverge segment crashes as a function of AADT and segment length

Group 2 (None of the models included section length as an independent variable)

- 6. All reported crashes as a function of AADT and segment type
- 7. All reported crashes as a function of AADT
- 8. Basic and weave Segment Crashes as a function of AADT
- 9. Merge segment crashes as a function of AADT
- 10. Diverge segment crashes as a function of AADT

The results of the statistical regression modelling were as follows:

Group 1:

- 1. All Crashes as a function of AADT, segment length and segment type: Segment type was insignificant.
- 2. All Crashes as a function of AADT and segment length: All variables were significant.
- 3. Basic and Weave Segment Crashes as a function of AADT and segment length: All variables were significant.
- 4. Merge Segment Crashes as a function of AADT and segment length: All variables were insignificant.
- 5. Diverge Segment Crashes as a function of AADT and segment length: AADT was insignificant.

Group 2:

- 6. All Crashes as a function of AADT and segment type: AADT and segment type variables were insignificant.
- 7. All Crashes as a function of AADT: All variables were significant.
- 8. Basic and Weave Segment Crashes as a function of AADT: All variables were insignificant.
- 9. Merge Segment Crashes as a function of AADT: All variables were insignificant.
- 10. Diverge Segment Crashes as a function of AADT: All variables were insignificant.

The results of the statistical modelling results and the statistical model forms are included in an appendix at the end of this memo. The results show that SFP2 in Group 1 and SPF7 in Group 2 were the only models in which all of their independent variables were found to be statistically significant. Of the two, SFP2 in Group 1 had a much higher R-squared value, which reflects a better "goodness of fit," compared to SPF7 in Group 2. Intuitively, predicted crashes should have a direct correlation to AADT and roadway segment length. The models in the Highway Safety Manual for crash prediction are also very similar in form but with different coefficients.

On the basis of the analysis conducted, the proposed SPF for express lanes on I-495 is given below for the non-linear and linear regression models.

Non-Linear Regression: Expectation (Crashes_{i,t}) = exponential (0.011022579 + 0.987113593 * $ln(Segment Length_{i,t}) + 0.141283034 * <math>ln(AADT_{i,t})$

Linear Regression: Expectation (Crashes_{i,t}) = $0.550840245 + 4.130999289 * Segment Length_{i,t}) - <math>0.000121228 * AADT_{i,t}$)

Where:

Crashes_{i,t} = Crashes/year on Segment i for Time period t,

Segment Length_{i,t} = Segment Length on Segment i for Time period t and

AADT_{i,t} = Average Annual Daily Traffic on Segment i for Time period t.

The non-linear regression form had an R-squared value of 0.51 and the linear regression form had an R-squared value of 0.564; therefore, the linear regression model form was chosen due to the better R-squared value. There was a challenge with linear regression model for a limited number of cases where the model had a negative prediction of crashes. To fix that challenge, the form of the linear regression model was modified to be the max value of 0 and linear regression predicted crashes; this change in the model form solved the challenge by replacing negative prediction of crashes with zero. The R-squared for the modified form continued to be 0.564.

On the basis of the analysis conducted, the proposed SPF for express lanes on I-495 is given below:

Expectation (Crashes_{i,t}) = Max[0.550840245 + 4.130999289 * Segment Length_{i,t}) -0.000121228 * AADT_{i,t}), 0]

Where:

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Crashes_{i,t} = Crashes/year on Segment i for Time period t,

Segment Length_{i,t} = Segment Length on Segment i for Time period t and

AADT_{i,t} = Average Annual Daily Traffic on Segment i for Time period t.

This equation applies to Merge Sections, Diverge Sections and Basic+Weave Sections. The Appendix includes a comparison of the actual crashes and predicted crashes for all segments in the existing conditions. The comparison shows the difference in the total crashes predicted using linear regression model versus actual crash performance is less than 1 crash in five years for existing conditions. The proposed SPF for I-495 Express lanes can be used for the prediction of crashes for future No-Build and Build alternatives for the I-495 Express Lanes Northern Extension project.

Appendix - Statistical Modelling Results

Comparison of Predicted Crashes versus Actual Crashes for Existing Crashes

			Length			Non- Linear Predicted	Linear Predicted
ID	Segment	Year	(miles)	AADT	Crashes	Crashes	Crashes
NB	Express Lanes – BS & WS Segments				<u>'</u>	<u>'</u>	
	BS - From the Southern NB Entrance to the on-ramp from						
1	Braddock Road	2013	2.27	7966	24.0	8.1	9.0
	BS - From the on-ramp from Braddock Rd to the on-ramp						
2	from Gallows Road	2013	2.61	9481	9.0	9.5	10.2
	BS - From the on-ramp from Gallows Road to the off-						
3	ramp to Lee Highway	2013	0.62	10879	2.0	2.3	1.8
4	BS - From the off-ramp to Lee Hwy to the off-ramp to I-66	2013	0.33	9741	3.0	1.2	0.7
	BS - From the off-ramp to I-66 to the on-ramp from I-66						
5	EB	2013	0.88	7671	0.0	3.2	3.3
	BS - From the on-ramp from I-66 EB to the off-ramp to						
6	Leesburg Pike (VA Rt 7)	2013	0.61	10782	2.0	2.3	1.8
	BS - From the off-ramp to Leesburg Pike (VA Rt 7) to the						
7	off-ramp to Westpark Drive Connector	2013	0.63	9320	2.0	2.3	2.0
	BS - From the off-ramp to Westpark Drive Connector to						
8	the on-ramp from Westpark Drive Connector	2013	0.5	8072	0.0	1.8	1.6
	WS - From the on-ramp from Westpark Drive Connector						
9	to the off-ramp to Jones Branch Connector	2013	0.18	8964	0.0	0.7	0.2
	BS - From the off-ramp to VA Rt 267 to the on-ramp from						
11	Jones Branch Connector	2013	0.28	926	0.0	0.8	1.6
	BS - From on-ramp from Jones Branch Connector to						
12	Northern NB Exit to GP Lane	2013	0.49	2786	2.0	1.5	2.2
	SubTotal BS&WS crashes	2013			44.0	33.7	34.4
	BS - From the Southern NB Entrance to the on-ramp from						
1	Braddock Road	2014	2.27	9349	14.0	8.3	8.8
2	BS - From the on-ramp from Braddock Rd to the on-ramp	2014	2.61	11168	9.0	9.7	10.0

	from Gallows Road						
	BS - From the on-ramp from Gallows Road to the off-						
3	ramp to Lee Highway	2014	0.62	12936	3.0	2.4	1.5
4	BS - From the off-ramp to Lee Hwy to the off-ramp to I-66	2014	0.33	11446	1.0	1.3	0.5
	BS - From the off-ramp to I-66 to the on-ramp from I-66						
5	EB	2014	0.88	9015	2.0	3.2	3.1
	BS - From the on-ramp from I-66 EB to the off-ramp to						
6	Leesburg Pike (VA Rt 7)	2014	0.61	12655	0.0	2.4	1.5
	BS - From the off-ramp to Leesburg Pike (VA Rt 7) to the						
7	off-ramp to Westpark Drive Connector	2014	0.63	10853	2.0	2.4	1.8
	BS - From the off-ramp to Westpark Drive Connector to						
8	the on-ramp from Westpark Drive Connector	2014	0.5	9373	5.0	1.9	1.5
	WS - From the on-ramp from Westpark Drive Connector						
9	to the off-ramp to Jones Branch Connector	2014	0.18	10663	0.0	0.7	0.0
	BS - From the off-ramp to VA Rt 267 to the on-ramp from						
11	Jones Branch Connector	2014	0.28	1255	0.0	0.8	1.6
	BS - From on-ramp from Jones Branch Connector to						
12	Northern NB Exit to GP Lane	2014	0.49	3277	2.0	1.6	2.2
	SubTotal BS&WS crashes	2014			38.0	34.5	32.5
	BS - From the Southern NB Entrance to the on-ramp from						
1	Braddock Road	2015	2.27	10783	9.0	8.4	8.6
	BS - From the on-ramp from Braddock Rd to the on-ramp						
2	from Gallows Road	2015	2.61	12714	3.0	9.9	9.8
	BS - From the on-ramp from Gallows Road to the off-						
3	ramp to Lee Highway	2015	0.62	14517	0.0	2.4	1.4
4	BS - From the off-ramp to Lee Hwy to the off-ramp to I-66	2015	0.33	12732	2.0	1.3	0.4
	BS - From the off-ramp to I-66 to the on-ramp from I-66						
5	EB	2015	0.88	10041	1.0	3.3	3.0
	BS - From the on-ramp from I-66 EB to the off-ramp to						
6	Leesburg Pike (VA Rt 7)	2015	0.61	13982	0.0	2.4	1.4
	BS - From the off-ramp to Leesburg Pike (VA Rt 7) to the						
7	off-ramp to Westpark Drive Connector	2015	0.63	11971	4.0	2.4	1.7
8	BS - From the off-ramp to Westpark Drive Connector to	2015	0.5	10422	3.0	1.9	1.4

	the on-ramp from Westpark Drive Connector						
	WS - From the on-ramp from Westpark Drive Connector						
9	to the off-ramp to Jones Branch Connector	2015	0.18	11962	0.0	0.7	0.0
	BS - From the off-ramp to VA Rt 267 to the on-ramp from						
11	Jones Branch Connector	2015	0.28	1529	0.0	0.8	1.5
	BS - From on-ramp from Jones Branch Connector to						
12	Northern NB Exit to GP Lane	2015	0.49	3714	2.0	1.6	2.1
	SubTotal BS&WS crashes	2015			24.0	35.1	31.2
	BS - From the Southern NB Entrance to the on-ramp from						
1	Braddock Road	2016	2.27	11547	10.0	8.5	8.5
	BS - From the on-ramp from Braddock Rd to the on-ramp						
2	from Gallows Road	2016	2.61	13560	6.0	10.0	9.7
	BS - From the on-ramp from Gallows Road to the off-						
3	ramp to Lee Highway	2016	0.62	15311	1.0	2.5	1.3
4	BS - From the off-ramp to Lee Hwy to the off-ramp to I-66	2016	0.33	13345	1.0	1.3	0.3
	BS - From the off-ramp to I-66 to the on-ramp from I-66						
5	EB	2016	0.88	10412	3.0	3.3	2.9
	BS - From the on-ramp from I-66 EB to the off-ramp to						
6	Leesburg Pike (VA Rt 7)	2016	0.61	14623	0.0	2.4	1.3
	BS - From the off-ramp to Leesburg Pike (VA Rt 7) to the						
7	off-ramp to Westpark Drive Connector	2016	0.63	12511	0.0	2.4	1.6
	BS - From the off-ramp to Westpark Drive Connector to						
8	the on-ramp from Westpark Drive Connector	2016	0.5	10891	2.0	1.9	1.3
	WS - From the on-ramp from Westpark Drive Connector						
9	to the off-ramp to Jones Branch Connector	2016	0.18	12507	0.0	0.7	0.0
	BS - From the off-ramp to VA Rt 267 to the on-ramp from						
11	Jones Branch Connector	2016	0.28	1625	0.0	0.8	1.5
	BS - From on-ramp from Jones Branch Connector to						
12	Northern NB Exit to GP Lane	2016	0.49	3804	1.0	1.6	2.1
	SubTotal BS&WS crashes	2016			24.0	35.4	30.5
	BS - From the Southern NB Entrance to the on-ramp from						
1	Braddock Road	2017	2.27	12506	9.0	8.6	8.4
2	BS - From the on-ramp from Braddock Rd to the on-ramp	2017	2.61	14677	5.0	10.1	9.6

	from Gallows Road						
	BS - From the on-ramp from Gallows Road to the off-						
3	ramp to Lee Highway	2017	0.62	16523	1.0	2.5	1.1
4	BS - From the off-ramp to Lee Hwy to the off-ramp to I-66	2017	0.33	14378	4.0	1.3	0.2
	BS - From the off-ramp to I-66 to the on-ramp from I-66						
5	EB	2017	0.88	11028	3.0	3.3	2.8
	BS - From the on-ramp from I-66 EB to the off-ramp to						
6	Leesburg Pike (VA Rt 7)	2017	0.61	15686	0.0	2.4	1.2
	BS - From the off-ramp to Leesburg Pike (VA Rt 7) to the						
7	off-ramp to Westpark Drive Connector	2017	0.63	13505	0.0	2.5	1.5
	BS - From the off-ramp to Westpark Drive Connector to						
8	the on-ramp from Westpark Drive Connector	2017	0.5	11793	1.0	1.9	1.2
	WS - From the on-ramp from Westpark Drive Connector						
9	to the off-ramp to Jones Branch Connector	2017	0.18	13720	0.0	0.7	0.0
	BS - From the off-ramp to VA Rt 267 to the on-ramp from						
11	Jones Branch Connector	2017	0.28	1767	0.0	0.8	1.5
	BS - From on-ramp from Jones Branch Connector to						
12	Northern NB Exit to GP Lane	2017	0.49	4180	2.0	1.6	2.1
	SubTotal BS&WS crashes	2017			25.0	35.8	29.5
SB E	Express Lanes – BS & WS Segments						
	BS - From Northern SB Entrance to the off-ramp to VA Rt						
24	267	2013	0.15	4565	1.0	0.5	0.6
	BS - From the off-ramp to VA Rt 267 to off-ramp to Jones						
26	Branch Connector	2013	0.21	3730	0.0	0.7	1.0
	BS - From the off-ramp to Jones Branch Connector to the						
28	on-ramp from Jones Branch Connector	2013	0.35	8345	1.0	1.3	1.0
	WS - From the on-ramp from VA Rt 267 to the off-ramp to						
32	Westpark Drive Connector	2013	0.17	6216	1.0	0.6	0.5
	BS - From the off-ramp to Westpark Drive Connector to						
34	the on-ramp from Westpark Drive Connector	2013	0.45	8072	2.0	1.6	1.4
	BS - From the on-ramp from Westpark Drive Connector to						
36	the on-ramp from Leesburg Pike (VA Rt 7)	2013	0.7	7356	9.0	2.5	2.6
38	BS - From the on-ramp from Leesburg Pike (VA Rt 7) to	2013	0.53	8336	4.0	1.9	1.7

	the off-ramp from I-66 WB						
	BS - From the off-ramp from I-66 WB to the on-ramp from						
40	I-66 WB & EB	2013	0.41	6577	2.0	1.5	1.4
	BS - From the on-ramp from I-66 WB and EB to the on-						
42	ramp from Lee Highway	2013	0.75	7755	6.0	2.7	2.7
	BS - From the on-ramp from Lee Highway to the off-ramp						
44	to Gallows Road	2013	0.56	8732	0.0	2.1	1.8
	BS - From the off-ramp to Gallows Road to the off-ramp						
46	to Braddock Road	2013	2.6	7353	20.0	9.1	10.4
	BS - From the off-ramp to Braddock Road to the Southern						
48	SB Exit	2013	1.39	5861	10.0	4.8	5.6
	SubTotal BS&WS crashes	2013			56.0	29.3	30.7
	BS - From Northern SB Entrance to the off-ramp to VA Rt						
24	267	2014	0.15	5300	1.0	0.5	0.5
	BS - From the off-ramp to VA Rt 267 to off-ramp to Jones						
26	Branch Connector	2014	0.21	4368	1.0	0.7	0.9
	BS - From the off-ramp to Jones Branch Connector to the						
28	on-ramp from Jones Branch Connector	2014	0.35	10064	0.0	1.3	0.8
	WS - From the on-ramp from VA Rt 267 to the off-ramp to						
32	Westpark Drive Connector	2014	0.17	7268	0.0	0.6	0.4
	BS - From the off-ramp to Westpark Drive Connector to						
34	the on-ramp from Westpark Drive Connector	2014	0.45	9373	0.0	1.7	1.3
	BS - From the on-ramp from Westpark Drive Connector to						
36	the on-ramp from Leesburg Pike (VA Rt 7)	2014	0.7	8646	3.0	2.6	2.4
	BS - From the on-ramp from Leesburg Pike (VA Rt 7) to						
38	the off-ramp from I-66 WB	2014	0.53	9862	4.0	2.0	1.5
	BS - From the off-ramp from I-66 WB to the on-ramp from						
40	I-66 WB & EB	2014	0.41	7806	1.0	1.5	1.3
	BS - From the on-ramp from I-66 WB and EB to the on-						
42	ramp from Lee Highway	2014	0.75	9253	4.0	2.8	2.5
	BS - From the on-ramp from Lee Highway to the off-ramp						
44	to Gallows Road	2014	0.56	10594	1.0	2.1	1.6
	BS - From the off-ramp to Gallows Road to the off-ramp						
46	to Braddock Road	2014	2.6	8972	7.0	9.4	10.2

	BS - From the off-ramp to Braddock Road to the Southern						
48	SB Exit	2014	1.39	7212	4.0	4.9	5.4
	SubTotal BS&WS crashes	2014			26.0	30.1	28.8
	BS - From Northern SB Entrance to the off-ramp to VA Rt						
24	267	2015	0.15	6446	0.0	0.5	0.4
	BS - From the off-ramp to VA Rt 267 to off-ramp to Jones						
26	Branch Connector	2015	0.21	5379	3.0	0.7	0.8
	BS - From the off-ramp to Jones Branch Connector to the						
28	on-ramp from Jones Branch Connector	2015	0.35	11394	0.0	1.3	0.6
	WS - From the on-ramp from VA Rt 267 to the off-ramp to						
32	Westpark Drive Connector	2015	0.17	8748	0.0	0.6	0.2
	BS - From the off-ramp to Westpark Drive Connector to						
34	the on-ramp from Westpark Drive Connector	2015	0.45	10422	0.0	1.7	1.1
	BS - From the on-ramp from Westpark Drive Connector to						
36	the on-ramp from Leesburg Pike (VA Rt 7)	2015	0.7	10352	2.0	2.6	2.2
	BS - From the on-ramp from Leesburg Pike (VA Rt 7) to						
38	the off-ramp from I-66 WB	2015	0.53	11785	1.0	2.0	1.3
	BS - From the off-ramp from I-66 WB to the on-ramp from						
40	I-66 WB & EB	2015	0.41	9326	0.0	1.5	1.1
	BS - From the on-ramp from I-66 WB and EB to the on-						
42	ramp from Lee Highway	2015	0.75	11083	5.0	2.8	2.3
	BS - From the on-ramp from Lee Highway to the off-ramp						
44	to Gallows Road	2015	0.56	12754	3.0	2.2	1.3
	BS - From the off-ramp to Gallows Road to the off-ramp						
46	to Braddock Road	2015	2.6	10880	5.0	9.7	10.0
	BS - From the off-ramp to Braddock Road to the Southern						
48	SB Exit	2015	1.39	8930	5.0	5.1	5.2
	SubTotal BS&WS crashes	2015			24.0	30.8	26.5
	BS - From Northern SB Entrance to the off-ramp to VA Rt						
24	267	2016	0.15	7372	1.0	0.5	0.3
	BS - From the off-ramp to VA Rt 267 to off-ramp to Jones						
26	Branch Connector	2016	0.21	6244	0.0	0.7	0.7
	BS - From the off-ramp to Jones Branch Connector to the						
28	on-ramp from Jones Branch Connector	2016	0.35	11903	0.0	1.4	0.6

	WS - From the on-ramp from VA Rt 267 to the off-ramp to						
32	Westpark Drive Connector	2016	0.17	9974	0.0	0.6	0.0
	BS - From the off-ramp to Westpark Drive Connector to						
34	the on-ramp from Westpark Drive Connector	2016	0.45	10891	0.0	1.7	1.1
	BS - From the on-ramp from Westpark Drive Connector to						
36	the on-ramp from Leesburg Pike (VA Rt 7)	2016	0.7	11851	2.0	2.7	2.0
	BS - From the on-ramp from Leesburg Pike (VA Rt 7) to						
38	the off-ramp from I-66 WB	2016	0.53	13566	1.0	2.1	1.1
	BS - From the off-ramp from I-66 WB to the on-ramp from						
40	I-66 WB & EB	2016	0.41	10685	1.0	1.6	0.9
	BS - From the on-ramp from I-66 WB and EB to the on-						
42	ramp from Lee Highway	2016	0.75	12820	6.0	2.9	2.1
	BS - From the on-ramp from Lee Highway to the off-ramp						
44	to Gallows Road	2016	0.56	14704	0.0	2.2	1.1
	BS - From the off-ramp to Gallows Road to the off-ramp						
46	to Braddock Road	2016	2.6	12473	4.0	9.8	9.8
	BS - From the off-ramp to Braddock Road to the Southern						
48	SB Exit	2016	1.39	10387	6.0	5.2	5.0
	SubTotal BS&WS crashes	2016			21.0	31.4	24.7
	BS - From Northern SB Entrance to the off-ramp to VA Rt	2016			21.0	31.4	24.7
24		2016	0.15	8446	0.0	31.4 0.6	0.1
24	BS - From Northern SB Entrance to the off-ramp to VA Rt		0.15	8446			
24	BS - From Northern SB Entrance to the off-ramp to VA Rt 267		0.15	8446 7177			
	BS - From Northern SB Entrance to the off-ramp to VA Rt 267 BS - From the off-ramp to VA Rt 267 to off-ramp to Jones	2017			0.0	0.6	0.1
	BS - From Northern SB Entrance to the off-ramp to VA Rt 267 BS - From the off-ramp to VA Rt 267 to off-ramp to Jones Branch Connector	2017			0.0	0.6	0.1
26	BS - From Northern SB Entrance to the off-ramp to VA Rt 267 BS - From the off-ramp to VA Rt 267 to off-ramp to Jones Branch Connector BS - From the off-ramp to Jones Branch Connector to the	2017 2017	0.21	7177	0.0	0.6	0.1
26	BS - From Northern SB Entrance to the off-ramp to VA Rt 267 BS - From the off-ramp to VA Rt 267 to off-ramp to Jones Branch Connector BS - From the off-ramp to Jones Branch Connector to the on-ramp from Jones Branch Connector WS - From the on-ramp from VA Rt 267 to the off-ramp to Westpark Drive Connector	2017 2017	0.21	7177	0.0	0.6	0.1
26	BS - From Northern SB Entrance to the off-ramp to VA Rt 267 BS - From the off-ramp to VA Rt 267 to off-ramp to Jones Branch Connector BS - From the off-ramp to Jones Branch Connector to the on-ramp from Jones Branch Connector WS - From the on-ramp from VA Rt 267 to the off-ramp to	2017 2017 2017	0.21	7177 13103	0.0	0.6 0.8 1.4	0.1 0.5 0.4
26	BS - From Northern SB Entrance to the off-ramp to VA Rt 267 BS - From the off-ramp to VA Rt 267 to off-ramp to Jones Branch Connector BS - From the off-ramp to Jones Branch Connector to the on-ramp from Jones Branch Connector WS - From the on-ramp from VA Rt 267 to the off-ramp to Westpark Drive Connector	2017 2017 2017	0.21	7177 13103	0.0	0.6 0.8 1.4	0.1 0.5 0.4
26 28 32	BS - From Northern SB Entrance to the off-ramp to VA Rt 267 BS - From the off-ramp to VA Rt 267 to off-ramp to Jones Branch Connector BS - From the off-ramp to Jones Branch Connector to the on-ramp from Jones Branch Connector WS - From the on-ramp from VA Rt 267 to the off-ramp to Westpark Drive Connector BS - From the off-ramp to Westpark Drive Connector to	2017 2017 2017 2017	0.21 0.35 0.17	7177 13103 11196	0.0 0.0 0.0 2.0	0.6 0.8 1.4 0.7	0.1 0.5 0.4 0.0
26 28 32	BS - From Northern SB Entrance to the off-ramp to VA Rt 267 BS - From the off-ramp to VA Rt 267 to off-ramp to Jones Branch Connector BS - From the off-ramp to Jones Branch Connector to the on-ramp from Jones Branch Connector WS - From the on-ramp from VA Rt 267 to the off-ramp to Westpark Drive Connector BS - From the off-ramp to Westpark Drive Connector to the on-ramp from Westpark Drive Connector	2017 2017 2017 2017	0.21 0.35 0.17	7177 13103 11196	0.0 0.0 0.0 2.0	0.6 0.8 1.4 0.7	0.1 0.5 0.4 0.0
26 28 32 34	BS - From Northern SB Entrance to the off-ramp to VA Rt 267 BS - From the off-ramp to VA Rt 267 to off-ramp to Jones Branch Connector BS - From the off-ramp to Jones Branch Connector to the on-ramp from Jones Branch Connector WS - From the on-ramp from VA Rt 267 to the off-ramp to Westpark Drive Connector BS - From the off-ramp to Westpark Drive Connector to the on-ramp from Westpark Drive Connector BS - From the on-ramp from Westpark Drive Connector to	2017 2017 2017 2017 2017	0.21 0.35 0.17 0.45	7177 13103 11196 11793	0.0 0.0 0.0 2.0	0.6 0.8 1.4 0.7	0.1 0.5 0.4 0.0
26 28 32 34	BS - From Northern SB Entrance to the off-ramp to VA Rt 267 BS - From the off-ramp to VA Rt 267 to off-ramp to Jones Branch Connector BS - From the off-ramp to Jones Branch Connector to the on-ramp from Jones Branch Connector WS - From the on-ramp from VA Rt 267 to the off-ramp to Westpark Drive Connector BS - From the off-ramp to Westpark Drive Connector to the on-ramp from Westpark Drive Connector BS - From the on-ramp from Westpark Drive Connector to the on-ramp from Leesburg Pike (VA Rt 7)	2017 2017 2017 2017 2017	0.21 0.35 0.17 0.45	7177 13103 11196 11793	0.0 0.0 0.0 2.0	0.6 0.8 1.4 0.7	0.1 0.5 0.4 0.0

	I-66 WB & EB						
	BS - From the on-ramp from I-66 WB and EB to the on-						
42	ramp from Lee Highway	2017	0.75	14311	1.0	2.9	1.9
	BS - From the on-ramp from Lee Highway to the off-ramp						
44	to Gallows Road	2017	0.56	16408	0.0	2.2	0.9
	BS - From the off-ramp to Gallows Road to the off-ramp						
46	to Braddock Road	2017	2.6	13992	8.0	10.0	9.6
40	BS - From the off-ramp to Braddock Road to the Southern	2047	4.00	44046	6.0	F 2	
48	SB Exit	2017	1.39	11816	6.0	5.3	4.9
	SubTotal BS&WS crashes	2017			20.0	31.9	22.8
	Express Lanes – MS Segments				I	I	l
19	MS - on-ramp from Braddock Road	2013	0.2	1515	1.0	0.6	1.2
20	MS - on-ramp from Gallows Road	2013	0.2	1398	2.0	0.6	1.2
21	MS - on-ramp from I-66 EB	2013	0.2	3110	3.0	0.6	1.0
23	MS - on-ramp from Jones Branch Connector	2013	0.2	926	0.0	0.5	1.3
	SubTotal MS crashes	2013			6.0	2.3	4.7
19	MS - on-ramp from Braddock Road	2014	0.2	1820	0.0	0.6	1.2
20	MS - on-ramp from Gallows Road	2014	0.2	1768	0.0	0.6	1.2
21	MS - on-ramp from I-66 EB	2014	0.2	3640	2.0	0.7	0.9
23	MS - on-ramp from Jones Branch Connector	2014	0.2	1255	0.0	0.6	1.2
	SubTotal MS crashes	2014			2.0	2.4	4.5
19	MS - on-ramp from Braddock Road	2015	0.2	1930	1.0	0.6	1.1
20	MS - on-ramp from Gallows Road	2015	0.2	1803	2.0	0.6	1.2
21	MS - on-ramp from I-66 EB	2015	0.2	3941	1.0	0.7	0.9
23	MS - on-ramp from Jones Branch Connector	2015	0.2	1529	0.0	0.6	1.2
	SubTotal MS crashes	2015			4.0	2.4	4.4
19	MS - on-ramp from Braddock Road	2016	0.2	2013	2.0	0.6	1.1
20	MS - on-ramp from Gallows Road	2016	0.2	1751	0.0	0.6	1.2
21	MS - on-ramp from I-66 EB	2016	0.2	4211	0.0	0.7	0.9
23	MS - on-ramp from Jones Branch Connector	2016	0.2	1625	0.0	0.6	1.2
	SubTotal MS crashes	2016			2.0	2.5	4.3
19	MS - on-ramp from Braddock Road	2017	0.2	2171	1.0	0.6	1.1

20	MS - on-ramp from Gallows Road	2017	0.2	1846	0.0	0.6	1.2
21	MS - on-ramp from I-66 EB	2017	0.2	4658	1.0	0.7	0.8
23	MS - on-ramp from Jones Branch Connector	2017	0.2	1767	0.0	0.6	1.2
	SubTotal MS crashes	2017			2.0	2.5	4.2
SBI	xpress Lanes – MS Segments						
29	MS - on-ramp from Jones Branch Connector	2013	0.08	926	1.0	0.2	0.8
35	MS - on-ramp from Westpark Drive Connector	2013	0.2	893	3.0	0.5	1.3
37	MS - on-ramp from Leesburg Pike (VA Rt 7)	2013	0.2	980	4.0	0.5	1.3
41	MS - on-ramp from I-66 WB & EB	2013	0.2	1178	0.0	0.6	1.2
43	MS - on-ramp from Lee Highway	2013	0.2	977	1.0	0.5	1.3
	SubTotal MS crashes	2013			9.0	2.4	5.8
29	MS - on-ramp from Jones Branch Connector	2014	0.08	1255	0.0	0.2	0.7
35	MS - on-ramp from Westpark Drive Connector	2014	0.2	1289	0.0	0.6	1.2
37	MS - on-ramp from Leesburg Pike (VA Rt 7)	2014	0.2	1216	2.0	0.6	1.2
41	MS - on-ramp from I-66 WB & EB	2014	0.2	1447	0.0	0.6	1.2
43	MS - on-ramp from Lee Highway	2014	0.2	1341	1.0	0.6	1.2
	SubTotal MS crashes	2014			3.0	2.5	5.6
29	MS - on-ramp from Jones Branch Connector	2015	0.08	1529	1.0	0.2	0.7
35	MS - on-ramp from Westpark Drive Connector	2015	0.2	1540	2.0	0.6	1.2
37	MS - on-ramp from Leesburg Pike (VA Rt 7)	2015	0.2	1432	2.0	0.6	1.2
41	MS - on-ramp from I-66 WB & EB	2015	0.2	1756	1.0	0.6	1.2
43	MS - on-ramp from Lee Highway	2015	0.2	1671	2.0	0.6	1.2
	SubTotal MS crashes	2015			8.0	2.6	5.4
29	MS - on-ramp from Jones Branch Connector	2016	0.08	1625	0.0	0.2	0.7
35	MS - on-ramp from Westpark Drive Connector	2016	0.2	1616	1.0	0.6	1.2
37	MS - on-ramp from Leesburg Pike (VA Rt 7)	2016	0.2	1715	3.0	0.6	1.2
41	MS - on-ramp from I-66 WB & EB	2016	0.2	2135	1.0	0.6	1.1
43	MS - on-ramp from Lee Highway	2016	0.2	1885	2.0	0.6	1.1
	SubTotal MS crashes	2016			7.0	2.6	5.3
29	MS - on-ramp from Jones Branch Connector	2017	0.08	1767	1.0	0.2	0.7
35	MS - on-ramp from Westpark Drive Connector	2017	0.2	1927	1.0	0.6	1.1

37	MS - on-ramp from Leesburg Pike (VA Rt 7)	2017	0.2	1852	3.0	0.6	1.2
41	MS - on-ramp from I-66 WB & EB	2017	0.2	2404	1.0	0.6	1.1
43	MS - on-ramp from Lee Highway	2017	0.2	2096	0.0	0.6	1.1
	SubTotal MS crashes	2017			6.0	2.7	5.2
NB	Express Lanes – DS Segments						
13	DS - off-ramp to Lee Highway	2013	0.2	1138	3.0	0.6	1.2
14	DS - off-ramp to I-66	2013	0.2	2070	2.0	0.6	1.1
15	DS - off-ramp to Leesburg Pike (VA Rt 7)	2013	0.2	1461	0.0	0.6	1.2
16	DS - off-ramp to Westpark Drive Connector	2013	0.2	1249	3.0	0.6	1.2
18	DS - off-ramp to VA Rt 267 NB	2013	0.13	2786	0.0	0.4	0.8
	SubTotal DS crashes	2013			8.0	2.7	5.5
13	DS - off-ramp to Lee Highway	2014	0.2	1490	1.0	0.6	1.2
14	DS - off-ramp to I-66	2014	0.2	2431	2.0	0.6	1.1
15	DS - off-ramp to Leesburg Pike (VA Rt 7)	2014	0.2	1803	0.0	0.6	1.2
16	DS - off-ramp to Westpark Drive Connector	2014	0.2	1479	0.0	0.6	1.2
18	DS - off-ramp to VA Rt 267 NB	2014	0.13	3277	0.0	0.4	0.7
	SubTotal DS crashes	2014			3.0	2.8	5.3
13	DS - off-ramp to Lee Highway	2015	0.2	1784	1.0	0.6	1.2
14	DS - off-ramp to I-66	2015	0.2	2692	0.0	0.6	1.1
15	DS - off-ramp to Leesburg Pike (VA Rt 7)	2015	0.2	2011	0.0	0.6	1.1
16	DS - off-ramp to Westpark Drive Connector	2015	0.2	1549	2.0	0.6	1.2
18	DS - off-ramp to VA Rt 267 NB	2015	0.13	3714	0.0	0.4	0.6
	SubTotal DS crashes	2015			3.0	2.8	5.2
13	DS - off-ramp to Lee Highway	2016	0.2	1966	1.0	0.6	1.1
14	DS - off-ramp to I-66	2016	0.2	2933	1.0	0.6	1.0
15	DS - off-ramp to Leesburg Pike (VA Rt 7)	2016	0.2	2112	0.0	0.6	1.1
16	DS - off-ramp to Westpark Drive Connector	2016	0.2	1619	1.0	0.6	1.2
18	DS - off-ramp to VA Rt 267 NB	2016	0.13	3804	0.0	0.4	0.6
	SubTotal DS crashes	2016			3.0	2.9	5.1
13	DS - off-ramp to Lee Highway	2017	0.2	2144	2.0	0.6	1.1
14	DS - off-ramp to I-66	2017	0.2	3351	1.0	0.6	1.0

15	DS - off-ramp to Leesburg Pike (VA Rt 7)	2017	0.2	2181	0.0	0.6	1.1
16	DS - off-ramp to Westpark Drive Connector	2017	0.2	1712	1.0	0.6	1.2
18	DS - off-ramp to VA Rt 267 NB	2017	0.13	4180	0.0	0.4	0.6
	SubTotal DS crashes	2017			4.0	2.9	5.0
SB E	Express Lanes – DS Segments						
25	DS - off-ramp to VA Rt 267 SB	2013	0.2	835	0.0	0.5	1.3
27	DS - off-ramp to Jones Branch Connector	2013	0.2	619	0.0	0.5	1.3
39	DS - off-ramp from I-66 WB	2013	0.2	1759	2.0	0.6	1.2
45	DS - off-ramp to Gallows Road	2013	0.2	1379	3.0	0.6	1.2
47	DS - off-ramp to Braddock Road	2013	0.2	1492	4.0	0.6	1.2
	SubTotal DS crashes	2013			9.0	2.8	6.1
25	DS - off-ramp to VA Rt 267 SB	2014	0.2	932	1.0	0.5	1.3
27	DS - off-ramp to Jones Branch Connector	2014	0.2	599	0.0	0.5	1.3
39	DS - off-ramp from I-66 WB	2014	0.2	2055	0.0	0.6	1.1
45	DS - off-ramp to Gallows Road	2014	0.2	1623	1.0	0.6	1.2
47	DS - off-ramp to Braddock Road	2014	0.2	1760	0.0	0.6	1.2
	SubTotal DS crashes	2014			2.0	2.8	6.0
25	DS - off-ramp to VA Rt 267 SB	2015	0.2	1067	1.0	0.6	1.2
27	DS - off-ramp to Jones Branch Connector	2015	0.2	568	0.0	0.5	1.3
39	DS - off-ramp from I-66 WB	2015	0.2	2458	3.0	0.6	1.1
45	DS - off-ramp to Gallows Road	2015	0.2	1874	0.0	0.6	1.1
47	DS - off-ramp to Braddock Road	2015	0.2	1959	1.0	0.6	1.1
	SubTotal DS crashes	2015			5.0	2.9	5.9
25	DS - off-ramp to VA Rt 267 SB	2016	0.2	1128	2.0	0.6	1.2
27	DS - off-ramp to Jones Branch Connector	2016	0.2	604	0.0	0.5	1.3
39	DS - off-ramp from I-66 WB	2016	0.2	2881	1.0	0.6	1.0
45	DS - off-ramp to Gallows Road	2016	0.2	2231	1.0	0.6	1.1
47	DS - off-ramp to Braddock Road	2016	0.2	2086	0.0	0.6	1.1
	SubTotal DS crashes	2016			4.0	2.9	5.8
25	DS - off-ramp to VA Rt 267 SB	2017	0.2	1269	0.0	0.6	1.2
27	DS - off-ramp to Jones Branch Connector	2017	0.2	617	0.0	0.5	1.3

39	DS - off-ramp from I-66 WB	2017	0.2	3319	2.0	0.6	1.0
45	DS - off-ramp to Gallows Road	2017	0.2	2416	1.0	0.6	1.1
47	DS - off-ramp to Braddock Road	2017	0.2	2176	1.0	0.6	1.1
	SubTotal DS crashes	2017			4.0	3.0	5.7
	TOTAL CRASHES				396.0	381.6	396.9

Statistical Model Forms

Group 1: 1 - All Crashes as a function of AADT, segment length and segment type – Linear Regression

SUMMARY OUTPUT						
Regression Sto	atistics					
Multiple R	0.753237136					
R Square	0.567366182					
Adjusted R Square	0.558924547					
Standard Error	2.016754958					
Observations	210					
ANOVA						
	df	SS	MS	F	Significance F	
Regression	4	1093.460528	273.3651319	67.21045757	2.98084E-36	
Residual	205	833.7966153	4.067300563			
Total	209	1927.257143				
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	0.455099982	0.304427175	1.494938759	0.136468169	-0.1451097	1.055309665
Var - Segment Length	4.081164737	0.266583921	15.30911812	8.80903E-36	3.555566945	4.606762528
Var - AADT	-0.00017734	5.41114E-05	-3.277318667	0.001230816	-0.000284026	-7.0654E-05
Var - Model Type 1	0.775941561	0.542836101	1.429421438	0.154405258	-0.294315996	1.846199118
Var - Model Type 2	0.199571911	0.41442907	0.481558668	0.630633148	-0.617517893	1.016661714

Group 1: 2 - All Crashes as a function of AADT and segment length – Linear Regression

SUMMARY OUTPUT						
Regression St	tatistics					
Multiple R	0.750749642					
R Square	0.563625024					
Adjusted R Square	0.559408841					
Standard Error	2.015647471					
Observations	210					
ANOVA						
	df	SS	MS	F	Significance F	
Regression	2	1086.250354	543.125177	133.6813366	5.31488E-38	
Residual	207	841.0067888	4.062834729			
Total	209	1927.257143				
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	0.550840245		2.382404616	0.018105085	0.095008249	1.006672241
X Variable 1	4.130999289	0.264245259	15.63320115	6.77688E-37	3.610042299	4.651956278
X Variable 2	-0.000121228	3.35931E-05	-3.608727273	0.00038588	-0.000187457	-5.49999E-05

Group 1: 3 - Basic and Weave Segment Crashes as a function of AADT and segment length – Linear Regression

SUMMARY OUTPUT						
Regression Sto	atistics					
Multiple R	0.751786543					
R Square	0.565183006					
Adjusted R Square	0.557418417					
Standard Error	2.556090366					
Observations	115					
ANOVA						
	df	SS	MS	F	Significance F	
Regression	2	951.1587676	475.5793838	72.78981454	5.56115E-21	
Residual	112	731.7629715	6.53359796			
Total	114	1682.921739				
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	1.299435488	0.723555074	1.795904052	0.075205939	-0.134196141	2.733067118
Var - Segment Length	4.085369457	0.338595845	12.06562196	5.52822E-22	3.414485194	4.75625372
Var - AADT	-0.000184639	7.03474E-05	-2.624668384	0.009883918	-0.000324023	-4.52542E-05

Group 1: 4 - Merge Segment Crashes as a function of AADT and segment length - Linear Regression

SUMMARY OUTPUT						
Regression Sto	atistics					
Multiple R	0.167869458					
R Square	0.028180155					
Adjusted R Square	-0.018096981					
Standard Error	1.071774855					
Observations	45					
ANOVA						
	df	SS	MS	F	Significance F	
Regression	2	1.398988129	0.699494065	0.608943369	0.548657135	
Residual	42	48.24545632	1.148701341			
Total	44	49.6444444				
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	0.280502347	0.835337028	0.335795419	0.738696895	-1.405276025	1.966280718
Var - Segment Length	4.754931687	4.309129521	1.103455272	0.276111891	-3.941243754	13.45110713
Var - AADT	-4.28738E-05	0.000196754	-0.217905741	0.828557812	-0.000439939	0.000354191

Group 1: 5 - Diverge Segment Crashes as a function of AADT and segment length – Linear Regression

SUMMARY OUTPUT						
Regression Sto	atistics					
Multiple R	0.313987521					
R Square	0.098588163					
Adjusted R Square	0.059396344					
Standard Error	1.021656556					
Observations	49					
ANOVA						
	df	SS	MS	F	Significance F	
Regression	2	5.251328694	2.625664347	2.515529153	0.091882944	
Residual	46	48.01397743	1.043782118			
Total	48	53.26530612				
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	-3.230890795	1.989573254	-1.623911453	0.111228507	-7.235694043	0.773912452
Var - Segment Length	19.24080239	8.811905381	2.183500794	0.034137274	1.503356834	36.97824795
Var - AADT	0.000205393	0.000213802	0.960671251	0.341740192	-0.000224967	0.000635754

Group 2: 6 - All Crashes as a function of AADT and segment type - Linear Regression

SUMMARY OUTPUT						
Regression Sto	atistics					
Multiple R	0.269724972					
R Square	0.072751561					
Adjusted R Square	0.059247943					
Standard Error	2.945332145					
Observations	210					
ANOVA						
	df	SS	MS	F	Significance F	
Regression	3	140.2109648	46.73698827	5.387560603	0.001371167	
Residual	206	1787.046178	8.674981447			
Total	209	1927.257143				
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	0.907172063	0.442498423	2.050113662	0.041619897	0.03476577	1.779578355
Var - AADT	-3.71069E-06	7.72706E-05	-0.048022058	0.961745188	-0.000156053	0.000148632
Var - Model Type 1	1.755330322	0.787250161	2.229698271	0.026846963	0.20322989	3.307430755
Var - Model Type 2	0.188571588	0.605244291	0.311562769	0.755687918	-1.004695779	1.381838954

Group 2: 7 - All Crashes as a function of AADT - Linear Regression

SUMMARY OUTPUT						
Regression St	atistics					
Multiple R	0.221762994					
R Square	0.049178826					
Adjusted R Square	0.04460757					
Standard Error	2.968161905					
Observations	210					
ANOVA						
	df	SS	MS	F	Significance F	
Regression	1	94.78024298	94.78024298	10.75827507	0.001217095	
Residual	208	1832.4769	8.809985096			
Total	209	1927.257143				
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	1.002623055	0.338290863	2.963789939	0.00339307	0.335704724	1.669541386
Var - AADT	0.000141744	4.32149E-05	3.279980955	0.001217095	5.65487E-05	0.000226939

Group 2: 8 - Basic and Weave Segment Crashes as a function of AADT - Linear Regression

SUMMARY OUTPUT						
Regression St	atistics					
Multiple R	0.001239642					
R Square	1.53671E-06					
Adjusted R Square	-0.008848007					
Standard Error	3.859156624					
Observations	115					
ANOVA						
	df	SS	MS	F	Significance F	
Regression	1	0.002586165	0.002586165	0.000173649	0.989509353	
Residual	113	1682.919153	14.89308985			
Total	114	1682.921739				
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	2.639498008	1.07946903	2.445181785	0.01602166	0.500875168	4.778120848
Var - AADT	-1.36657E-06	0.000103704	-0.013177582	0.989509353	-0.000206823	0.00020409

Group 2: 9 - Merge Segment Crashes as a function of AADT - Linear Regression

SUMMARY OUTPUT						
Regression St	atistics					
Multiple R	0.002514256					
R Square	6.32148E-06					
Adjusted R Square	-0.023249345					
Standard Error	1.074483441					
Observations	45					
ANOVA						
	df	SS	MS	F	Significance F	
Regression	1	0.000313827	0.000313827	0.000271825	0.986922032	
Residual	43	49.64413062	1.154514666			
Total	44	49.6444444				
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	1.094795327	0.392422755	2.789836502	0.007829064	0.303399417	1.886191237
Var - AADT	-3.19734E-06	0.000193929	-0.016487131	0.986922032	-0.000394293	0.000387898

Group 2: 10 - Basic and Weave Segment Crashes as a function of AADT - Linear Regression

SUMMARY OUTPUT								
Regression St	atistics							
Multiple R	0.071841641							
R Square	0.005161221							
Adjusted R Square	-0.016005561							
Standard Error	1.06181691							
Observations	49							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	1	0.274914037	0.274914037	0.243835896	0.62374909			
Residual	47	52.99039209	1.127455151					
Total	48	53.26530612						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	ower 95.0%	Ipper 95.0%
Intercept	1.043630191	0.368954663	2.828613638	0.006851573	0.301389148	1.785871234	0.301389	1.785871
Var - AADT	-8.57686E-05	0.000173692	-0.493797424	0.62374909	-0.000435192	0.000263654	-0.00044	0.000264

Safety Performance Function for Managed Lanes Predicted Crash Frequency for the HOT Lane Facility

2045 No Build Predicted Annual Crash Frequency for the HOT Managed Lanes along I-495 in Virginia

									Fatal		
			Segment Number		L				and		
#	Interchange		and Description		(mi)	n	ADT	AADT	Injury	PDO	Total
		BS	SB ML MP 1.19 - MP 0.88	1649	0.31	2	14490	14056	0.33	0.90	1.24
		MS	SB ML MP 0.88 - MP 0.79	500	0.09	3	11403	7375	0.09	0.25	0.35
	Southern Study Limit to	BS	SB ML MP 0.79 - MP 0.00	4163	0.79	2	17105	16592	0.85	2.30	3.16
1	GWMP	BS	NB ML MP 0.00 - MP 0.63	3325	0.63	2	17555	17029	0.69	1.85	2.54
		DS	NB ML MP 0.63 - MP 0.72	500	0.09	2	17555	17029	0.11	0.29	0.39
		BS	NB ML MP 0.72 - MP 1.02	1565	0.30	2	15215	14759	0.32	0.86	1.18
				Subtotal	2.22				2.39	6.46	8.85

2045 Preferred Alternative Predicted Annual Crash Frequency for the HOT Managed Lanes along I-495 in Virginia

									Fatal		
		Segment Number							and		
#	Interchange		and Description		L (mi)	n	ADT	AADT	Injury	PDO	Total
		BS	NB ML MP 13.69 - 14.43	3930	0.74	2	19560	18974	0.82	2.22	3.04
		BS	NB ML MP 14.43 - 14.50	390	0.07	3	19560	12649	0.08	0.21	0.29
		DS	NB ML MP 14.50 - 14.59	500	0.09	3	19560	12649	0.10	0.27	0.37
	Southern Study Limit	BS	NB ML MP 14.59 - 15.02	2245	0.43	2	17700	17169	0.47	1.26	1.72
1	to GWMP	BS	SB ML MP 15.06 - 14.60	2412	0.46	2	16585	16088	0.49	1.34	1.83
		MS	SB ML MP 14.60 - 14.51	500	0.09	3	21575	13952	0.10	0.28	0.38
		BS	SB ML MP 14.51 - 14.46	239	0.05	3	21575	13952	0.05	0.13	0.18
		BS	SB ML MP 14.46 - MP 13.71	3956	0.75	2	21575	20928	0.84	2.26	3.10
			Si	ubtotal	2.68				2.95	7.98	10.93
2		BS	NB ML MP 15.02 - 15.37	1704	0.32	2	17700	17169	0.35	0.96	1.31

									Fatal		
			Segment Number						and		
#	Interchange		and Description	L (ft)	L (mi)	n	ADT	AADT	Injury	PDO	Total
		MS	NB ML MP 15.37 - 15.39	124	0.02	3	25095	16229	0.03	0.07	0.10
	GWMP to Maryland	BS	SB ML MP 15.39 - 15.25	741	0.14	2	29360	28480	0.17	0.45	0.62
	State Line	BS	SB ML MP 15.25 - 15.23	118	0.02	3	29360	18987	0.03	0.07	0.10
	State Line	DS	SB ML MP 15.23 - 15.14	500	0.09	3	29360	18987	0.11	0.29	0.40
		BS	SB ML MP 15.14 - 15.06	441	0.08	2	16585	16088	0.09	0.25	0.34
				Subtotal	0.69				0.77	2.09	2.87
				Total	6.74				3.72	10.07	13.79

2045 Preferred Alternative Predicted Annual Crash Frequency for the HOT Managed Lanes along I-495 in Maryland

									Fatal		
			Segment Number						and		
#	Interchange		and Description	L (ft)	L (mi)	n	ADT	AADT	Injury	PDO	Total
	Virginia State Line to	MS	NB ML MP 0.00 - MP 0.07	376	0.07	3	25090	16225	0.08	0.21	0.29
	Clara Barton	BS	NB ML MP 0.07 - MP 0.15	954	0.18	3	25090	16225	0.20	0.54	0.73
1	Parkway	BS	NB ML MP 0.15 - MP 0.39	1246	0.24	2	25090	24338	0.27	0.74	1.01
	raikway	BS	SB ML MP 0.49 - MP 0.00	2575	0.49	2	29360	28480	0.57	1.55	2.12
			9	Subtotal	0.98				1.12	3.04	4.16
		BS	NB ML MP 0.39 - MP 1.74	7152	1.35	2	25090	24338	1.53	4.15	5.68
	Clara Barton	BS	NB ML MP 1.74 - MP 1.85	601	0.11	3	25090	16225	0.13	0.34	0.47
	Clara Barton	DS	NB ML MP 1.85 - MP 1.94	500	0.09	3	25090	16225	0.10	0.28	0.39
2	Parkway to MD 190	BS	NB ML MP 1.94 - MP 2.08	760	0.14	2	20290	19682	0.16	0.44	0.60
	(River Road) / Cabin John Parkway	MS	NB ML MP 2.08 - MP 2.17	500	0.09	3	25095	16229	0.10	0.28	0.39
	Julii Faikway —	BS	NB ML MP 2.17 - MP 2.25	435	0.08	3	25095	16229	0.09	0.25	0.34
		DS	SB ML MP 2.35 - MP 2.28	388	0.07	3	30165	19507	0.08	0.23	0.31

									Fatal		
			Segment Number						and		
#	Interchange		and Description	L (ft)	L (mi)	n	ADT	AADT	Injury	PDO	Total
		BS	SB ML MP 2.28 - MP 2.13	815	0.15	2	25165	24411	0.18	0.49	0.67
		MS	SB ML MP 2.13 - MP 2.04	500	0.09	3	29360	18987	0.11	0.29	0.40
		BS	SB ML MP 2.04 - MP 1.99	275	0.05	3	29360	18987	0.06	0.16	0.22
		BS	SB ML MP 1.99 - MP 0.49	7909	1.50	2	29360	28480	1.73	4.68	6.42
			9	Subtotal	3.76				4.29	11.59	15.88
		BS	NB ML MP 2.25 - MP 2.47	1178	0.22	3	25095	16229	0.24	0.66	0.90
		MS	NB ML MP 2.47 - MP 2.56	500	0.09	4	30195	14645	0.10	0.28	0.38
		BS	NB ML MP 2.56 - MP 2.60	187	0.04	4	30195	14645	0.04	0.11	0.14
	MAD 100 (Diver Deed)	BS	NB ML MP 2.60 - MP 3.25	3421	0.65	3	30195	19527	0.72	1.94	2.66
	MD 190 (River Road) / Cabin John	DS	NB ML MP 3.25 - MP 3.34	500	0.09	3	30195	19527	0.11	0.29	0.40
3	Parkway to I-495/ I-	MS	SB ML MP 3.55 - MP 3.46	500	0.09	3	34650	22407	0.11	0.30	0.41
3	270 Split	BS	SB ML MP 3.46 - MP 2.70	4015	0.76	3	34650	22407	0.86	2.32	3.18
	270 Spiit	BS	SB ML MP 2.70	22	0.00	4	34650	16806	0.00	0.01	0.02
		DS	SB ML MP 2.70 - MP 2.61	500	0.09	4	34650	16806	0.11	0.28	0.39
		BS	SB ML MP 2.61 - MP 2.37	1252	0.24	3	30165	19507	0.27	0.72	0.99
			SB ML MP 2.37 - MP 2.35	112	0.02	3	30165	19507	0.02	0.07	0.09
	Subto				2.31				2.58	6.98	9.56
					14.08				7.99	21.61	29.60

2045 Preferred Alternative Predicted Annual Crash Frequency for the HOT Managed Lanes along I-270 & East Spur

									Fatal		
			Segment Number						and		
#	Interchange		and Description	L (ft)	L (mi)	n	ADT	AADT	Injury	PDO	Total
1	I-495/ I-270 Split	BS	NB ML MP 0.61 - MP 1.54	4932	0.93	1	5225	10138	0.94	2.54	3.48
	to MD 187	BS	SB ML MP 1.54 - MP 0.96	3048	0.58	1	5735	11126	0.59	1.60	2.19
			9	Subtotal	1.51			10632	1.53	4.14	5.67
2	MD 187 to	BS	NB ML MP 1.54 - MP 1.83	1508	0.29	1	5225	10138	0.29	0.79	1.08
	Rockledge	BS	SB ML MP 1.83 - MP 1.54	1510	0.29	1	5735	11126	0.30	0.80	1.10
	Boulevard										
			9	Subtotal	0.57			10632	0.59	1.59	2.18
3	Rockledge	BS	NB ML MP 1.83 - MP 2.73	4741	0.90	1	5225	10138	0.90	2.44	3.35
	Boulevard to I-	BS	SB ML MP 2.68 - MP 1.83	4474	0.85	1	5735	11126	0.86	2.34	3.20
	270 West Spur/I-										
	270 Split										
			9	Subtotal	1.75				1.77	4.78	6.55
4		MS	NB ML MP 2.73 - MP 2.82	500	0.09	3	26320	17021	0.11	0.29	0.39
	I-270 West Spur/I-	BS	NB ML MP 2.82 - MP 4.13	6895	1.31	2	26320	25531	1.49	4.03	5.52
	270 Split to	BS	SB ML MP 4.15 - MP 2.85	6876	1.30	2	31385	30444	1.52	4.12	5.64
	Montrose Road	BS	SB ML MP 2.85 - MP 2.77	422	0.08	3	31385	20296	0.09	0.25	0.34
		DS	SB ML MP 2.77 - MP 2.68	500	0.09	3	31385	20296	0.11	0.29	0.40
		Si		Subtotal	2.88				3.32	8.97	12.29
5	Montrose Road to	BS	NB ML MP 4.13 - MP 4.51	1988	0.38	2	26320	25531	0.44	1.18	1.62
	Wootton Parkway	DS	NB ML MP 4.51 - MP 4.52	62	0.01	2	26320	25531	0.01	0.04	0.05
	wootton Faikway	DS	NB ML MP 4.52 - MP 4.60	438	0.08	3	26320	17021	0.09	0.25	0.34

									Fatal		
			Segment Number						and		
#	Interchange		and Description	L (ft)	L (mi)	n	ADT	AADT	Injury	PDO	Total
		BS	NB ML MP 4.60 - MP 4.89	1538	0.29	2	21755	21103	0.33	0.89	1.22
		BS	SB ML MP 4.91 - MP 4.60	1630	0.31	2	20210	19604	0.35	0.93	1.28
		MS	SB ML MP 4.60 - MP 4.51	500	0.09	3	31385	20296	0.11	0.29	0.40
		BS	SB ML MP 4.51 - MP 4.42	452	0.09	3	31385	20296	0.10	0.26	0.36
		BS	SB ML MP 4.42 - MP 4.15	1426	0.27	2	31385	30444	0.32	0.87	1.19
			S	Subtotal	1.52				1.75	4.72	6.47
6		BS	NB ML MP 4.89 - MP 5.11	1140	0.22	2	21755	21103	0.25	0.66	0.91
		MS	NB ML MP 5.11 - MP 5.20	500	0.09	3	31660	20474	0.11	0.29	0.40
	Wootton Parkway	BS	NB ML MP 5.20 - MP 5.49	1525	0.29	2	31660	30711	0.34	0.93	1.28
	to MD 189	BS	SB ML MP 5.50 - MP 5.25	1405	0.27	2	26990	26181	0.31	0.84	1.15
	to MID 189	DS	SB ML MP 5.25 - MP 5.23	107	0.02	2	26990	26181	0.02	0.07	0.09
		DS	SB ML MP 5.23 - MP 5.16	393	0.07	3	26990	17454	0.08	0.23	0.31
		BS	SB ML MP 5.16 - MP 4.91	1233	0.23	2	20210	19604	0.26	0.71	0.97
			S	Subtotal	1.19				1.38	3.73	5.11
7	MD 189 to MD 28	BS	NB ML MP 5.49 - MP 6.46	5131	0.97	2	31660	30711	1.14	3.09	4.23
	1010 103 (0 1010 20	BS	SB ML MP 6.47 - MP 5.50	5144	0.97	2	26990	26181	1.12	3.03	4.15
			S	Subtotal	1.95				2.26	6.12	8.38
8		BS	NB ML MP 6.46 - MP 7.19	3858	0.73	2	31660	30711	0.86	2.33	3.19
		DS	NB ML MP 7.19 - MP 7.22	145	0.03	2	31660	30711	0.03	0.09	0.13
	MD 28 to W.	DS	NB ML MP 7.22 - MP 7.29	355	0.07	3	31660	20474	0.08	0.21	0.29
	Gude Drive	BS	NB ML MP 7.29 - MP 7.56	1422	0.27	2	18315	17766	0.30	0.81	1.10
		BS	SB ML MP 7.55 - MP 7.25	1605	0.30	2	16930	16423	0.33	0.90	1.23
		MS	SB ML MP 7.25 - MP 7.16	500	0.09	3	26990	17454	0.11	0.29	0.39

									Fatal		
			Segment Number						and		
#	Interchange		and Description	L (ft)	L (mi)	n	ADT	AADT	Injury	PDO	Total
		BS	SB ML MP 7.16	15	0.00	3	26990	17454	0.00	0.01	0.01
		BS	SB ML MP 7.16 - MP 6.47	3644	0.69	2	26990	26181	0.80	2.15	2.95
			S	Subtotal	2.19				2.51	6.78	9.29
9		BS	NB ML MP 7.56 - MP 7.83	1409	0.27	2	18315	17766	0.30	0.80	1.09
		MS	NB ML MP 7.83 - MP 7.92	467	0.09	3	23305	15071	0.10	0.26	0.36
		MS	NB ML MP 7.92	33	0.01	2	23305	22606	0.01	0.02	0.03
	W. Gude Drive to	BS	NB ML MP 7.92 - MP 8.37	2370	0.45	2	23305	22606	0.51	1.38	1.89
	Shady Grove Road	BS	SB ML MP 8.35 - MP 7.91	2331	0.44	2	23230	22534	0.50	1.36	1.86
		DS	SB ML MP 7.91	24	0.00	2	23230	22534	0.01	0.01	0.02
		DS	SB ML MP 7.91 - MP 7.82	476	0.09	3	23230	15023	0.10	0.27	0.37
		BS	SB ML MP 7.82 - MP 7.55	1416	0.27	2	16930	16423	0.29	0.79	1.09
			S	ubtotal	1.61				1.81	4.89	6.70
	Shady Grove Road	BS	NB ML MP 8.37 - MP 8.62	1316	0.25	2	23305	22606	0.29	0.77	1.06
	to I-370	DS	NB ML MP 8.62 - MP 8.71	500	0.09	2	23305	22606	0.11	0.30	0.41
		MS	SB ML MP 8.64 - MP 8.55	500	0.09	2	23230	22534	0.11	0.30	0.41
		BS SB ML MP 8.55 - MP 8.35		1059	0.20	2	23230	22534	0.23	0.62	0.85
			S	ubtotal	0.64				0.74	1.99	2.72
	Total				15.81				17.65	47.72	65.37

2045 Preferred Alternative Predicted Annual Crash Frequency for the HOT Managed Lanes along I-270 West Spur

									Fatal		
		Segment Number							and		
#	Interchange		and Description	L (ft)	L (mi)	n	ADT	AADT	Injury	PDO	Total
		BS	NB ML MP 0.00 - MP 1.09	5742	1.09	2	22885	22199	1.22	3.30	4.52
		BS	NB ML MP 1.08 - MP 1.11	105	0.02	3	22885	14799	0.02	0.06	0.08
		DS	NB ML MP 1.11 - MP 1.20	500	0.09	3	22885	14799	0.10	0.28	0.38
	I-495/ I-270 West	BS	NB ML MP 1.20 - MP 1.21	57	0.01	2	19585	18998	0.01	0.03	0.05
	Spur Split to	MS	SB ML MP 1.21 - MP 1.12	472	0.09	3	12940	8368	0.09	0.24	0.33
1	Democracy	BS	SB ML MP 1.12 - MP 1.07	290	0.05	3	12940	8368	0.06	0.15	0.21
	Boulevard	BS	SB ML MP 1.07 - MP 0.76	1614	0.31	2	12940	12552	0.32	0.87	1.19
		MS	SB ML MP 0.76 - MP 0.67	500	0.09	3	27160	17564	0.11	0.29	0.39
		BS	SB ML MP 0.67 - MP 0.58	456	0.09	3	27160	17564	0.10	0.26	0.36
		BS	SB ML MP 0.58 - MP 0.12	2449	0.46	2	27160	26346	0.54	1.46	2.00
			9	Subtotal	2.31				1.36	3.67	5.03
		BS	NB ML MP 1.21 - MP 1.25	215	0.04	2	19585	18998	0.05	0.13	0.17
		MS	NB ML MP 1.25 - MP 1.34	500	0.09	3	23025	14890	0.10	0.28	0.38
	Democracy	BS	NB ML MP 1.34 - MP 1.55	1101	0.21	3	23025	14890	0.23	0.61	0.84
2	Boulevard to	BS	SB ML MP 1.55 - 1.45	510	0.10	2	19500	18915	0.11	0.30	0.40
2	Westlake Terrace	DS	SB ML MP 1.45 - 1.36	500	0.09	2	19500	18915	0.11	0.29	0.40
		BS	SB ML MP 1.36 - 1.22	763	0.14	2	10760	10438	0.15	0.40	0.55
		MS	SB ML MP 1.22 - 1.21	28	0.01	3	12940	8368	0.01	0.02	0.02
	S		ubtotal	0.69				0.75	2.02	2.77	
	Westlake Terrace to	BS	NB ML MP 1.55 - MP 1.59	229	0.04	3	23025	14890	0.05	0.13	0.18
3		DS	NB ML MP 1.59 - MP 1.68	500	0.09	3	23025	14890	0.10	0.28	0.38
	I-270		NB ML MP 1.68 - MP 1.80	658	0.12	2	13650	13241	0.13	0.36	0.49

#	Interchange		Segment Number and Description	L (ft)	L (mi)	n	ADT	AADT	Fatal and Injury	PDO	Total
		MS	NB ML MP 1.80 - MP 1.89	500	0.09	3	21090	13639	0.10	0.28	0.38
		BS	NB ML MP 1.89 - MP 1.94	241	0.05	3	21090	13639	0.05	0.13	0.18
		BS	NB ML MP 1.94 - MP 2.33	2077	0.39	2	21090	20458	0.44	1.19	1.64
		BS	SB ML MP 2.26 - MP 1.94	1685	0.32	2	25650	24881	0.37	1.00	1.37
		BS	SB ML MP 1.94 - MP 1.91	157	0.03	3	25650	16587	0.03	0.09	0.12
		DS	SB ML MP 1.91 - MP 1.82	500	0.09	3	25650	16587	0.11	0.28	0.39
		BS	SB ML MP 1.82 - MP 1.55	1446	0.27	2	19500	18915	0.31	0.83	1.13
			S	Subtotal	1.51				1.69	4.58	6.27
		•		Total	9.01				3.80	10.27	14.07



Crash Prediction Tools for Unconventional Interchanges & Ramp Terminals



CRASH PREDICTION TOOLS FOR UNCONVENTIONAL INTERCHANGES & RAMP TERMINALS

Safety Performance Function for Single Point Diamond Interchange

The publication titled *Safpety Performance of Crossroad Ramp Terminals at Single-Point and Tight Diamond Interchanges* provides a Safety Performance Function for a Single Point Diamond interchange that predicts crashes based on traffic volumes on the ramps and crossroad, and number of free-flow right-turns from the exit ramps to the crossroad.

Equation

$$N_{spf,fatal \& injury} = e^{-1 .71 + 0.88 \times \ln(AADT_{xrd}) + 0.88 \times \ln(AADT_{ramp})}$$

$$N_{spf,PDO} = e^{-15.60 + 0.61 \times \ln(AADT_{xrd}) + 1.15 \times \ln(AADT_{ramp})}$$

Where,

N_{spf}, fatal & injury = Predicted average fatal and injury crash frequency

 $N_{spf, PDO}$ = Predicted average PDO crash frequency

AADT_{xrd} = Annual Average Daily Traffic along the crossroad

AADT_{ramp} = Annual Average Daily Traffic along the interchange ramps

Citation

Torbic, D.J., Porter R.J., Gooch, J., and Kersavage, K., Safety Performance of Crossroad Ramp Terminals at Single-Point and Tight Diamond Interchanges, Transportation Research Record: Journal of The Transportation Research Board, Volume 2675, No. 12, 2021.

<https://doi.org/10.1177/03611981211029931>

Safety Performance Function for Conventional Diamond Interchange

The Highway Safety Manual, Chapter 19 Table 19-15 supplies a Safety Performance Function for a Conventional Diamond interchange that predicts crashes at each of the ramp terminals based on traffic volumes on the ramps and crossroad, intensity of development, and number of crossroads through lanes.

Equation

$$N_{spf,fatal~\&~injury} = e^{-2.335 + 1.191 \times \ln(0.001 \times AADT_{xrd}) + 0.131 \times \ln(0.001 \times AADT_{ex}) + 0.001 \times AADT_{en}}$$
 $N_{spf,PDO} = -2.072 + 0.879 \times \ln(0.001 \times AADT_{xrd}) + 0.545 \times \ln(0.001 \times AADT_{ex} + 0.001 \times AADT_{en})$

Where,

 $N_{spf,~fatal~\&~injury} = \text{Predicted average fatal and injury crash frequency}$
 $N_{spf,~PDO} = \text{Predicted average PDO crash frequency}$
 $AADT_{xrd} = \text{Annual Average Daily Traffic along the crossroad}$

 $\mathsf{AADT}_\mathsf{ex}\,$ = Annual Average Daily Traffic along the exit ramp

AADT_{en} = Annual Average Daily Traffic along the entrance ramp



Crash Modification Factor for Converting Conventional Diamond to Diverging Diamond Interchange

The publication titled *Systematic Safety Evaluation of Diverging Diamond Interchanges Based on Nationwide Implementation Data* supplies a Crash Modification Factor for converting a Conventional Diamond Interchange to a Diverging Diamond.

Crash Modification Factors

CMF ID	IF ID CMF Name		Quality	Crash Severity
10762	Convert diamond interchange to Diverging Diamond Interchange or Double Crossover Diamond	0.558	***	K (fatal), A (serious injury), B (minor injury), C (possible injury)
10763	Convert diamond interchange to Diverging Diamond Interchange or Double Crossover Diamond	0.92	***	O (property damage only)

Citation

Abdelrahman, A., M. Abdel-Aty, J. Yuan, and M. Al-Omari. Systematic Safety Evaluation of Diverging Diamond Interchanges Based on Nationwide Implementation Data. Transportation Research Record: Journal of The Transportation Research Board, Volume 2675, No. 9, 2021.

https://doi.org/10.1177/03611981211004961>



Crash Prediction Tools for Unconventional Interchanges & Ramp Terminals

Predicted Crash Frequency for the I-270 at MD 189 Interchange

for the

No Build Scenario

Crash Prediction Model for Four-Leg Terminal with Diagonal Ramp (D4)

I-270 at MD 189 Great Falls Road - 2045 No Build

Crash Severity	а	b	С	d
FI Crashes	-2.335	1.191	0.001	0.131
PDO Crashes	-2.072	0.879	0.001	0.545

$N_{spf} = exp[a + b * In(c * AADT_{xrd}) + d * In(c * AADT_{ex} + c * AADT_{en})]$	Terminal 1	Terminal 2	Total
N _{spf} (predicted average crash frequency, crashes/year)	21.26	21.26	42.52
N _{spf,Fl} (predicted FI average crash frequency, crashes/year)	8.10	8.31	16.41
N _{spf,PDO} (predicted PDO average crash frequency, crashes/year)	13.16	12.95	26.11

 $\textbf{Table 19-15.} \ \, \textbf{SPF Coefficients for Crashes at Signalized Ramp Terminals} \\ \textbf{—Four-Leg Terminal with Diagonal Ramps} \ \, (D4)$

		Number of		SPF Co	efficient		Inverse
Crash Severity (z)	Area Type	Crossroad Through Lanes (n)	а	ь	c	d	Dispersion Parameter K _{w. SGn. at. z}
Fatal and	Rural or urban	2	-2.655	1.191	0.001	0.131	11.5
injury (fi)		3	-2.495	1.191	0.001	0.131	11.5
		4	-2.335	1.191	0.001	0.131	11.5
		5 (urban only)	-2.175	1.191	0.001	0.131	11.5
		6 (urban only)	-2.015	1.191	0.001	0.131	11.5
Property	Rural or urban	2	-2.248	0.879	0.001	0.545	7.21
damage only		3	-2.160	0.879	0.001	0.545	7.21
(pdo)		4	-2.072	0.879	0.001	0.545	7.21
		5 (urban only)	-1.985	0.879	0.001	0.545	7.21
		6 (urban only)	-1.897	0.879	0.001	0.545	7.21

Source: Highway Safety Manual 1st Edition Chapter 19, pg. 19-39

2045 No Build ADT Volumes

	Termi	nal 1		Terminal 2								
Outside Crossroad WB	SBR	WBL	Inside Crossroad WB	Inside Crossroad WB	NBL	WBR	Outside Crossroad WB					
15465	7525	7475	15415	15415	2870	3985	16530					
15095	4095	3415	14415	14415	6195	7730	15950					
Outside Crossroad EB	EBR	SBL	Inside Crossroad EB	Inside Crossroad EB	EBL	NBR	Outside Crossroad FR					

Crash Prediction Model for Single-Point Diamond Interchange (SPUI)

I-270 at MD 189 Great Falls Road - 2045 No Build

 $\begin{array}{ll} {\sf AADT}_{xd} \; ({\sf AADT} \; {\sf on} \; {\sf the} \; {\sf crossroad}, {\sf veh/day}) & 30575 \\ {\sf AADT}_{ramp} \; ({\sf sum} \; {\sf of} \; {\sf ramp} \; {\sf AADTs}, {\sf veh/day}) & 41997 \\ exit_free_right \; ({\sf number} \; {\sf of} \; {\sf exit} \; {\sf ramps} \; {\sf with} \; {\sf free_flow} \; {\sf right} \; {\sf turns}) & 0 \\ \end{array}$

Crash Severity	а	b	С
Total Crashes	-15.31	0.69	1.08
FI Crashes	-16.71	0.88	0.88
PDO Crashes	-15.60	0.61	1.15

$N_{spf} = exp[a + b * In (AADT_{xrd}) + c * In(AADT_{ramp})]$

N _{spf} (predicted average crash frequency, crashes/year)	27.47		27.47
N _{spf,Fl} (predicted FI average crash frequency, crashes/year)	5.73	23%	6.38
N _{spf,PDO} (predicted PDO average crash frequency, crashes/year)	18.96	77%	21.09

Table 4. SPF Coefficients for Crossroad Ramp Terminals at Single-Point Diamond Interchanges (Based on Equation 2) (4)

	Number of Free-		SPF Coefficient		
Crash Severity	Flow Right Turns from Exit Ramp to Crossroad	а	В	с	Dispersion Parameter
	0	-15.31	0.69	1.08	0.10
Total Crashes	1	-15.91	0.69	1.08	0.10
	2	-16.51	0.69	1.08	0.10
Fatal-and-	0	-16.71	0.88	0.88	0.11
Injury	1	-17.29	0.88	0.88	0.11
Crashes	2	-17.87	0.88	0.88	0.11
Property-	0	-15.60	0.61	1.15	0.10
Damage-	1	-16.20	0.61	1.15	0.10
Only Crashes	2	-16.80	0.61	1.15	0.10

There are no additional base conditions.

Source: Torbic, Darren et al (July 2020), Safety Performance of Crossroad Ramp Terminals at Single-Point and Tight Diamond Interchanges, pg. 10 pw:\\shavmpwx.shacadd.ad.mdot.mdstate:SHAPWP3\Documents\OP3\13- I495-I270 CR P3- Program Team\13.4 Technical Engineering & Support\13.4.14 Traffic\Engineering\F. Modeling\IAPA\Safety\Quantitative Analysis\Unconventional Interchange Analysis\SPUI and TUD Analysis.pdf



Crash Prediction Tools for Unconventional Interchanges & Ramp Terminals

Predicted Crash Frequency for the I-270 at MD 189 Interchange

for the

Preferred Alternative

Crash Prediction Model for Diverging Diamond Interchange (DDI)

I-270 at MD 189 Great Falls Road - 2045 Phase 1 Build

	Terminal 1	Terminal 2
AADT _{xrd} (AADT on the crossroad, veh/day)	29302	31504
AADT _{ex}	9075	9254
AADT _{en}	11272	9036
Number of Cross Road Through Lanes	4	4

Crash Severity	а	b	С	d
FI Crashes	-2.335	1.191	0.001	0.131
PDO Crashes	-2.072	0.879	0.001	0.545

Prediected Crash Frequency for D4 Configuration

$N_{spf} = exp[a + b * ln (c * AADT_{xrd}) + d * ln(c * AADT_{ex} + c * AADT_{en})]$	Terminal 1	Terminal 2	Total
N _{spf} (predicted average crash frequency, crashes/year)	20.69	21.36	42.06
N _{spf,Fl} (predicted FI average crash frequency, crashes/year)	8.02	8.63	16.65
N _{spf.PDO} (predicted PDO average crash frequency, crashes/year)	12.67	12.74	25.41

 $N_{pred} = N_{SPF} * C_i * CMF_j$

N_{SPF} – predicted crash frequency for D4 ramp terminal SPF (crashes/year) C_i – Local calibration factor for ramp terminal SPF CMF_i – crash modification factor for D4 to DDI CMFk - crash modification factor for D4 to SPUI CMFI - crash modification factor for SPUI to DDI N_{pred} – predicted crash frequency (crashes/year) for DDI

Termin	al 1	Termin	al 2	Te	otal			
FI	PDO	FI	PDO	FI	PDO		D4 to DDI	CMF
8.02	12.67	8.63	12.74				FI	PDO
1	1	1	1			CMF	0.558	0.92
0.558	0.92	0.558	0.92			CMF ID	10762	10763
0.389	0.808	0.389	0.808			Star Rating	****	****
1.435	1.139	1.435	1.139					
4.48	11.65	4.81	11.72					

	2045 Build ADT Volumes											
	Terminal 1				Termin	al 2						
Outside Crossroad WB	SBR	WBL	Inside Crossroad WB	Inside Crossroad WB	NBL	WBR	Outside Crossroad WB					
14440	6290	8305	16455	16455	2445	3720	17730					
14885	3315	3065	14635	14635	5595	7095	16135					
Outside Crossroad EB	EBR	SBL	Inside Crossroad EB	Inside Crossroad EB	EBL	NBR	Outside Crossroad EB					

Table 19-15. SPF Coefficients for Crashes at Signalized Ramp Terminals—Four-Leg Terminal with Diagonal

		Number of		SPF Coefficient					
Crash Severity (z)	Area Type	Crossroad Through Lanes (n)	а	ь	c	d	Dispersion Parameter K _{sc SGe, se. :}		
Fatal and	Rural or urban	2	-2.655	1.191	0.001	0.131	11.5		
injury (fi)		3	-2.495	1.191	0.001	0.131	11.5		
		4	-2.335	1.191	0.001	0.131	11.5		
		5 (urban only)	-2.175	1.191	0.001	0.131	11.5		
		6 (urban only)	-2.015	1.191	0.001	0.131	11.5		
Property	Rural or urban	2	-2.248	0.879	0.001	0.545	7.21		
damage only		3	-2.160	0.879	0.001	0.545	7.21		
(pdo)		4	-2.072	0.879	0.001	0.545	7.21		
		5 (urban only)	-1.985	0.879	0.001	0.545	7.21		
		6 (urban only)	-1.897	0.879	0.001	0.545	7.21		

Source: Highway Safety Manual 1st Edition Chapter 19, pg. 19-39



Crossroad Predictive Crash Analysis Predicted Crash Frequency for the Urban and Suburban Arterials using Chapter 12 of the HSM

for the

No Build Scenario

0	Worksheet 2A General Information and Input	Data for Orban and Suburban Ar			
Analyst					
Agency or Company			e e e e e e e e e e e e e e e e e e e		
Date Performed	02/18/21	*			
	1	20.10			
Intersection type (3ST, 3SG, 4ST, 4SG)	Input Data	Base Conditions			
3. (, , , , , , , , , , , , , , , , , ,	AADT = 67.700 (vah/dav)		100		
AADT major (veh/day)			· · · · · · · · · · · · · · · · · · ·		
AADT _{minor} (veh/day)	$AADI_{MAX} = 33,400 (veh/day)$		- 7		
Intersection lighting (present/not present)		Not Present	Present		
Calibration factor, C _i		1.00	1.00		
Data for unsignalized intersections only:					
Number of major-road approaches with	left-turn lanes (0,1,2)	0	2		
Number of major-road approaches with	right-turn lanes (0,1,2)	0	1		
Data for signalized intersections only:					
Number of approaches with left-turn land	es (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	4		
Number of approaches with right-turn la	nes (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	3		
Number of approaches with left-turn sign	nal phasing [for 3SG, use maximum value of 3]		4		
Type of left-turn signal phasing for Leg #	‡ 1	Permissive	Permissive / Protected		
Type of left-turn signal phasing for Leg #	‡ 2		Protected		
Type of left-turn signal phasing for Leg #			Permissive / Protected		
Type of left-turn signal phasing for Leg #	‡4 (if applicable)		Protected		
11 0	n-red prohibited [for 3SG, use maximum value of 3]	0	•		
Intersection red light cameras (present/r		Not Present			
Maximum number of lanes crossed by a	1 (laliesx)		6		
Number of bus stops within 300 m (1,00	,	0	3		
Schools within 300 m (1,000 ft) of the in	\(\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	Not Present	Not Present		
Number of alcohol sales establishments	within 300 m (1,000 ft) of the intersection	0	0		

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections											
(1)	(2)	(3)	(4)	(5)	(6)	(7)						
CMF for Left-Turn Lanes	CMF for Left-Turn Signal Phasing	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF						
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}						
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)						
0.66	0.87	0.88	1.00	0.91	1.00	0.46						

	Worksheet 2C Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections													
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)					
Crash Severity Level SF		PF Coefficien	ts	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted				
-			Parameter, k	Initial N _{bimv}	Crashes	N _{bimv}	CMFs	Factor, C _i	N_{bimv}					
	fr	from Table 12-10		from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)				
	а	b	С	IIOIII Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)				
Total	-10.99	1.07	0.23	0.39	7.201	1.000	7.201	0.46	1.00	3.316				
Fotal and Injuny (FI)	1) 13 14 1 19 0	-13.14 1.18 0.22 0.33	0.33	2.336	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	2.421	0.46	1.00	1.115					
Fatal and Injury (FI)	-13.14	1.10	0.22	0.33	2.330	0.336	2.421	0.46	1.00	1.115				
Property Damage Only	-11.02	1.02	0.24	0.44	4.612	(5) _{TOTAL} -(5) _{FI}	4.780	0.46	1.00	2.201				
(PDO)	-11.02	1.02	0.24	0.44	4.012	0.664	4.700	0.46	1.00	2.201				

Worksheet 2D Multiple-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections											
(1)	(2)	(3)	(4)	(5)	(6)						
Collision Type	Proportion of Collision Type(FI)	Predicted N bimv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv (TOTAL)} (crashes/year)						
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C						
Total	1.000	1.115	1.000	2.201	3.316						
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)						
Rear-end collision	0.450	0.502	0.483	1.063	1.565						
Head-on collision	0.049	0.055	0.030	0.066	0.121						
Angle collision	0.347	0.387	0.244	0.537	0.924						
Sideswipe	0.099	0.110	0.032	0.070	0.181						
Other multiple-vehicle collision	0.055	0.061	0.211	0.464	0.526						

Worksheet 2E Single-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections													
(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)			
	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted				
				Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}			
Crash Severity Level	from Table 12-12				from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)			
	2	b	С	from Table 12-12	(FI) from Eqn. 12-		(+)TOTAL (3)	Worksheet 2B		(0) (1) (0)			
	а	b	C		24 or 12-27								
Total	-10.21	0.68	0.27	0.36	0.434	1.000	0.434	0.46	1.00	0.200			
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.108	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.109	0.46	1.00	0.050			
						0.251							
Property Damage Only	44.04	0.70	0.05	0.44	0.322	(5) _{TOTAL} -(5) _{FI}	0.325	0.46	1.00	0.150			
(PDO)	-11.34	0.78	0.25	0.44		0.749							

	Worksheet 2F Single-V	ehicle Collisions by Collisi	ion Type for Urban and Suburba	n Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N bisv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv (TOTAL)} (crashes/year)
	from Table 12-13	(9)FI from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.050	1.000	0.150	0.200
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.000	0.000
Collision with fixed object	0.744	0.037	0.870	0.130	0.167
Collision with other object	0.072	0.004	0.070	0.010	0.014
Other single-vehicle collision	0.040	0.002	0.023	0.003	0.005
Single-vehicle noncollision	0.141	0.007	0.034	0.005	0.012

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(2)	(3)	(4)	(5)	(7)*				
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}				
Crash Seventy Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total				-					
atal and injury (FI)				1					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections								
(1)	(1) (2) (3)								
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF						
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CiviF						
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)						
4.15	1.00	1.00	4.15						

		Workshe	et 2I Vehicle	-Pedestrian C	collisions for l	Jrban and Suburba	n Arterial Signalized Inte	rsections		
(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	SPF Coefficients				Overdispersion	$N_{pedbase}$	Combined CMF	Calibration	Predicted N _{pedi}	
Crash Seventy Level		from Table 12-14					from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)
	а	b	С	d	е		IIOIII Equation 12-29	(4) HOIH WORKSHEEL ZIT		(4) (3) (0)
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.072	4.15	1.00	0.298
Fatal and Injury (FI)									1.00	0.298

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(7)*				
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}				
Crash Seventy Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)				
Total	3.316	0.200	3.516	0.015	0.053				
Fatal and injury (FI)				1	0.053				

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksh	neet 2K Crash Severity Distribution for Urban a	nd Suburban Arterial Intersections	
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE	·	
Rear-end collisions (from Worksheet 2D)	0.502	1.063	1.565
Head-on collisions (from Worksheet 2D)	0.055	0.066	0.121
Angle collisions (from Worksheet 2D)	0.387	0.537	0.924
Sideswipe (from Worksheet 2D)	0.110	0.070	0.181
Other multiple-vehicle collision (from Worksheet 2D)	0.061	0.464	0.526
Subtotal	1.115	2.201	3.316
	SINGLE-VEHICLE		•
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 2F)	0.037	0.130	0.167
Collision with other object (from Worksheet 2F)	0.004	0.010	0.014
Other single-vehicle collision (from Worksheet 2F)	0.002	0.003	0.005
Single-vehicle noncollision (from Worksheet 2F)	0.007	0.005	0.012
Collision with pedestrian (from Worksheet 2G or 2I)	0.298	0.000	0.298
Collision with bicycle (from Worksheet 2J)	0.053	0.000	0.053
Subtotal	0.400	0.150	0.550
Total	1.515	2.351	3.866

Worksheet 2L Summary Resu	ılts for Urban and Suburban Arterial Intersections
(1)	(2)
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)
	(Total) from Worksheet 2K
Total	3.9
Fatal and injury (FI)	1.5
Property damage only (PDO)	2.4

	Worksheet 2A General Information and Input	Data for Orban and Suburban Arter	
	Information		Location Information
Analyst	PC	Roadway	Rockledge Drive
Agency or Company	ATCS	Intersection	ckledge Dr at I-270 SB Off-Ramp/I-270 SB Ramp Connec
Date Performed	02/18/21	Jurisdiction	Montgomery County
		Analysis Year	2045
	ut Data	Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)	AADT		3SG
AADT _{major} (veh/day)	$AADT_{MAX} = 58,100 (veh/day)$		24,333
AADT _{minor} (veh/day)	$AADT_{MAX} = 16,400 (veh/day)$	-	13,337
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C _i		1.00	1.00
Data for unsignalized intersections only:			
Number of major-road approaches with left	-turn lanes (0,1,2)	0	0
Number of major-road approaches with rigit	nt-turn lanes (0,1,2)	0	1
Data for signalized intersections only:			-
Number of approaches with left-turn lanes	(0,1,2,3,4) [for 3SG, use maximum value of 3]	0	0
Number of approaches with right-turn lanes	s (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	2
Number of approaches with left-turn signal	phasing [for 3SG, use maximum value of 3]		0
Type of left-turn signal phasing for Leg #1		Permissive	Not Applicable
Type of left-turn signal phasing for Leg #2			Not Applicable
Type of left-turn signal phasing for Leg #3			Permissive
Type of left-turn signal phasing for Leg #4	(if applicable)		Not Applicable
Number of approaches with right-turn-on-re	ed prohibited [for 3SG, use maximum value of 3]	0	1
Intersection red light cameras (present/not		Not Present	Not Present
Sum of all pedestrian crossing volumes (P	edVol) Signalized intersections only		3
Maximum number of lanes crossed by a pe	edestrian (n _{lanesx})		7
Number of bus stops within 300 m (1,000 f	7	0	2
Schools within 300 m (1,000 ft) of the inters	\ \	Not Present	Not Present
Number of alcohol sales establishments wi	thin 300 m (1,000 ft) of the intersection	0	0

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(6)	(7)				
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF				
	Phasing									
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}				
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)				
1.00	1.00	0.92	0.98	0.91	1.00	0.82				

		Worksheet	2C Multiple-	Vehicle Collisions by Seve	rity Level for Urban	and Suburban Arterial I	ntersections				
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Crash Severity Level	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
-			Paramete		Parameter, k	Initial N _{bimv}	Crashes	N _{bimv}	CMFs	Factor, C _i	N_{bimv}
	fr	from Table 12-10		from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from	Ī	(6)*(7)*(8)	
	а	b	С	IIOIII Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)	
Total	-12.13	1.11	0.26	0.33	4.712	1.000	4.712	0.82	1.00	3.876	
Fotal and Injuny (FI)	11 50	44.50	-0 4.00	0.17	0.30	1.400	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	1.474	0.82	1.00	1.213
Fatal and Injury (FI)	-11.58 1.02	1.02	0.17	0.30	1.400	0.313	1.474	0.02	1.00	1.213	
Property Damage Only	-13.24	1.14	0.30	0.36	3.074	(5) _{TOTAL} -(5) _{FI}	3.238	0.82	1.00	2.663	
(PDO)	-13.24	1.14	0.30	0.30	3.074	0.687	3.236	0.02	1.00	2.003	

	Worksheet 2D Multiple-	Vehicle Collisions by Collis	sion Type for Urban and Suburb	an Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N bimv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv (TOTAL)} (crashes/year)
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C
Total	1.000	1.213	1.000	2.663	3.876
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.549	0.666	0.546	1.454	2.120
Head-on collision	0.038	0.046	0.020	0.053	0.099
Angle collision	0.280	0.340	0.204	0.543	0.883
Sideswipe	0.076	0.092	0.032	0.085	0.177
Other multiple-vehicle collision	0.057	0.069	0.198	0.527	0.596

		Worksheet	2E Single-V	ehicle Collisions by Severi	ty Level for Urban	and Suburban Arterial In	tersections			
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
				Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}
Crash Severity Level	fr	rom Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)
	a b c from Table 12	from Table 12-12	(FI) from Eqn. 12-		(+)TOTAL (3)	Worksheet 2B		(0) (1) (0)		
	а	D	C		24 or 12-27					
Total	-9.02	0.42	0.40	0.36	0.376	1.000	0.376	0.82	1.00	0.309
Estal and Injury (EI)	-9.75	0.27	0.51	0.24	0.113	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.118	0.82	1.00	0.097
Fatal and Injury (FI)	-9.75	0.27	0.51	0.24	0.113	0.315	0.116	0.02	1.00	0.097
Property Damage Only	0.00	0.45	0.00	0.50	0.040	(5) _{TOTAL} -(5) _{FI}	0.057	0.00	4.00	0.040
(PDO)	-9.08	0.45	0.33	0.53	0.246	0.685	0.257	0.82	1.00	0.212

	Worksheet 2F Single-V	ehicle Collisions by Collis	ion Type for Urban and Suburba	n Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bisv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv (TOTAL)} (crashes/year)
	from Table 12-13	(9)FI from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.097	1.000	0.212	0.309
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.001	0.000	0.003	0.001	0.001
Collision with fixed object	0.653	0.064	0.895	0.190	0.253
Collision with other object	0.091	0.009	0.069	0.015	0.023
Other single-vehicle collision	0.045	0.004	0.018	0.004	0.008
Single-vehicle noncollision	0.209	0.020	0.014	0.003	0.023

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(2)	(3)	(4)	(5)	(7)*				
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}				
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total				-					
atal and injury (FI)				1					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections								
(1)	(1) (2) (3) (4)								
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF						
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CiviF						
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)						
2.78	1.00	1.00	2.78						

Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections											
(1)	(2)					(3)	(4)	(5)	(6)	(7)	
SPF Coefficients Crash Severity Level			Overdispersion	Overdispersion	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}			
Crash Severity Level		from Table 12-14					from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)	
	а	b	С	d	е		nom Equation 12 20	(4) Holli Workshoet 211		(4) (0) (0)	
Total	-6.60	0.05	0.24	0.41	0.09	0.52	0.006	2.78	1.00	0.016	
Fatal and Injury (FI)							==		1.00	0.016	

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(7)*				
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}				
Crash Seventy Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)				
Total	3.876	0.309	4.185	0.011	0.046				
Fatal and injury (FI)				-	0.046				

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksr	neet 2K Crash Severity Distribution for Urban a	nd Suburban Arterial Intersections	
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE	·	
Rear-end collisions (from Worksheet 2D)	0.666	1.454	2.120
Head-on collisions (from Worksheet 2D)	0.046	0.053	0.099
Angle collisions (from Worksheet 2D)	0.340	0.543	0.883
Sideswipe (from Worksheet 2D)	0.092	0.085	0.177
Other multiple-vehicle collision (from Worksheet 2D)	0.069	0.527	0.596
Subtotal	1.213	2.663	3.876
	SINGLE-VEHICLE	•	
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.001	0.001
Collision with fixed object (from Worksheet 2F)	0.064	0.190	0.253
Collision with other object (from Worksheet 2F)	0.009	0.015	0.023
Other single-vehicle collision (from Worksheet 2F)	0.004	0.004	0.008
Single-vehicle noncollision (from Worksheet 2F)	0.020	0.003	0.023
Collision with pedestrian (from Worksheet 2G or 2I)	0.016	0.000	0.016
Collision with bicycle (from Worksheet 2J)	0.046	0.000	0.046
Subtotal	0.160	0.212	0.371
Total	1.372	2.875	4.247

Worksheet 2L Summary Resul	ts for Urban and Suburban Arterial Intersections
(1)	(2)
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)
	(Total) from Worksheet 2K
Total	4.2
Fatal and injury (FI)	1.4
Property damage only (PDO)	2.9

Works	heet 2A General Information and Inpu	t Data for Urban and Suburban Art	erial Intersections
General Informa	ition		Location Information
Analyst	PC	Roadway	Rockledge Drive
Agency or Company	ATCS	Intersection	ckledge Dr at I-270 SB On-Ramp/I-270 NB Ramp Connec
Date Performed	02/18/21	Jurisdiction	Montgomery County
		Analysis Year	2045
Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)	AADT		3SG
AADT _{major} (veh/day)	$AADT_{MAX} = 58,100$ (veh/day)		26,071
AADT _{minor} (veh/day)	$AADT_{MAX} = 16,400$ (veh/day)		18,530
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C _i		1.00	1.00
Data for unsignalized intersections only:			
Number of major-road approaches with left-turn land	es (0,1,2)	0	1
Number of major-road approaches with right-turn la	nes (0,1,2)	0	0
Data for signalized intersections only:			
Number of approaches with left-turn lanes (0,1,2,3,4	4) [for 3SG, use maximum value of 3]	0	2
Number of approaches with right-turn lanes (0,1,2,3	s,4) [for 3SG, use maximum value of 3]	0	0
Number of approaches with left-turn signal phasing	[for 3SG, use maximum value of 3]		2
Type of left-turn signal phasing for Leg #1		Permissive	Protected
Type of left-turn signal phasing for Leg #2			Protected
Type of left-turn signal phasing for Leg #3			Not Applicable
Type of left-turn signal phasing for Leg #4 (if application)	able)		Not Applicable
Number of approaches with right-turn-on-red prohib	ited [for 3SG, use maximum value of 3]	0	0
Intersection red light cameras (present/not present)		Not Present	Not Present
Sum of all pedestrian crossing volumes (PedVol)			6
Maximum number of lanes crossed by a pedestrian	(laresx)		5
Number of bus stops within 300 m (1,000 ft) of the i		0	0
Schools within 300 m (1,000 ft) of the intersection (Not Present	Not Present
Number of alcohol sales establishments within 300	m (1,000 ft) of the intersection	0	0

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections										
(1)	(2)	(3)	(4)	(5)	(6)	(7)					
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF					
	Phasing										
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}					
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)					
0.86	0.88	1.00	1.00	0.91	1.00	0.69					

(1)	Worksheet 2C Multiple-		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
Crash Severity Level	SPF Coefficients		Overdispersion Parameter, k	Initial N _{bimv}	Proportion of Total Crashes	Adjusted N _{bimv}	Combined CMFs	Calibration Factor, C _i	Predicted N _{bimv}	
	a fr	om Table 12-1 b	0 c	from Table 12-10	from Equation 12- 21		(4) _{TOTAL} *(5)	(7) from Worksheet 2B		(6)*(7)*(8)
Total	-12.13	1.11	0.26	0.33	5.541	1.000	5.541	0.69	1.00	3.835
Fatal and Injury (FI)	-11.58	1.02	0.17	0.30	1.588	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.302	1.673	0.69	1.00	1.158
Property Damage Only (PDO)	-13.24	1.14	0.30	0.36	3.670	(5) _{TOTAL} -(5) _{FI} 0.698	3.868	0.69	1.00	2.677

	Worksheet 2D Multiple-	Vehicle Collisions by Collis	sion Type for Urban and Suburb	an Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N bimv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N $_{bimv}$ (TOTAL) (crashes/year)
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C
Total	1.000	1.158	1.000	2.677	3.835
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.549	0.636	0.546	1.461	2.097
Head-on collision	0.038	0.044	0.020	0.054	0.098
Angle collision	0.280	0.324	0.204	0.546	0.870
Sideswipe	0.076	0.088	0.032	0.086	0.174
Other multiple-vehicle collision	0.057	0.066	0.198	0.530	0.596

		Worksheet	2E Single-V	ehicle Collisions by Severi	ty Level for Urban a	and Suburban Arterial In	ersections			
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
			Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}	
Crash Severity Level	fr	om Table 12-1	ole 12-12		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)
	a b c	from Table 12-12	(FI) from Eqn. 12-		(T)TOTAL (O)	Worksheet 2B		(0) (1) (0)		
	а	ь	· ·	ì	24 or 12-27					
Total	-9.02	0.42	0.40	0.36	0.441	1.000	0.441	0.69	1.00	0.305
Fatal and Injury (FI)	-9.75	0.27	0.51	0.24	0.136	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.143	0.69	1.00	0.099
ratai and injury (Fi)	-9.75	0.27	0.51	0.24	0.130	0.325	0.143	0.09	1.00	0.099
Property Damage Only	0.00	0.45	0.22	0.52	0.000	(5) _{TOTAL} -(5) _{FI}	0.200	0.60	4.00	0.006
(PDO)	-9.08	0.45	0.33	0.53	0.283	0.675	0.298	0.69	1.00	0.206

	Worksheet 2F Single-V	ehicle Collisions by Collis	ion Type for Urban and Suburba	n Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N bisv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv (TOTAL)} (crashes/year)
	from Table 12-13	(9)FI from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.099	1.000	0.206	0.305
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.001	0.000	0.003	0.001	0.001
Collision with fixed object	0.653	0.065	0.895	0.184	0.249
Collision with other object	0.091	0.009	0.069	0.014	0.023
Other single-vehicle collision	0.045	0.004	0.018	0.004	0.008
Single-vehicle noncollision	0.209	0.021	0.014	0.003	0.024

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(2)	(3)	(4)	(5)	(7)*				
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}				
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total									
Fatal and injury (FI)				-					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections								
(1)	(1) (2) (3) (4)								
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF						
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined Civir						
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)						
1.00	1.00	1.00	1.00						

		Workshe	et 2I Vehicle	-Pedestrian C	Collisions for U	Jrban and Suburba	n Arterial Signalized Inte	rsections		
(1)	(2)					(3)	(4)	(5)	(6)	(7)
SPF Coefficients Crash Severity Level			Overdispersion	$N_{pedbase}$	Combined CMF	Calibration	Predicted N _{pedi}			
Crash Severity Level		from Table 12-14					from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)
	а	b	С	d	е		IIOIII Equation 12-29	(4) HOIH WORKSHEEL ZIT		(4) (3) (0)
Total	-6.60	0.05	0.24	0.41	0.09	0.52	0.007	1.00	1.00	0.007
Fatal and Injury (FI)									1.00	0.007

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(7)*				
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}				
Crash Severity Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)				
Total	3.835	0.305	4.140	0.011	0.046				
Fatal and injury (FI)					0.046				

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksho	eet 2K Crash Severity Distribution for Urban a	nd Suburban Arterial Intersections	
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE	•	
Rear-end collisions (from Worksheet 2D)	0.636	1.461	2.097
Head-on collisions (from Worksheet 2D)	0.044	0.054	0.098
Angle collisions (from Worksheet 2D)	0.324	0.546	0.870
Sideswipe (from Worksheet 2D)	0.088	0.086	0.174
Other multiple-vehicle collision (from Worksheet 2D)	0.066	0.530	0.596
Subtotal	1.158	2.677	3.835
	SINGLE-VEHICLE		
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.001	0.001
Collision with fixed object (from Worksheet 2F)	0.065	0.184	0.249
Collision with other object (from Worksheet 2F)	0.009	0.014	0.023
Other single-vehicle collision (from Worksheet 2F)	0.004	0.004	0.008
Single-vehicle noncollision (from Worksheet 2F)	0.021	0.003	0.024
Collision with pedestrian (from Worksheet 2G or 2I)	0.007	0.000	0.007
Collision with bicycle (from Worksheet 2J)	0.046	0.000	0.046
Subtotal	0.152	0.206	0.358
Total	1.310	2.883	4.192

Worksheet 2L Summary Resul	Its for Urban and Suburban Arterial Intersections
(1)	(2)
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)
	(Total) from Worksheet 2K
Total	4.2
Fatal and injury (FI)	1.3
Property damage only (PDO)	2.9

000000	Worksheet 2A General Information and Input Information	Data to: Orban and Odbarban Art	Location Information
Analyst	ST	Roadway	MD 28
Agency or Company	ATCS	Intersection	MD 28 at Hurley Ave.
Date Performed	06/08/20	Jurisdiction	Montgomery County
		Analysis Year	2045
	out Data	Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)			4SG
AADT _{major} (veh/day)	$AADT_{MAX} = 67,700 (veh/day)$		55,220
AADT _{minor} (veh/day)	$AADT_{MAX} = 33,400 (veh/day)$		7,147
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C _i		1.00	1.00
Data for unsignalized intersections only:			
Number of major-road approaches with left	t-turn lanes (0,1,2)	0	0
Number of major-road approaches with rig	ht-turn lanes (0,1,2)	0	0
Data for signalized intersections only:			
Number of approaches with left-turn lanes	(0,1,2,3,4) [for 3SG, use maximum value of 3]	0	2
Number of approaches with right-turn lane	s (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	2
Number of approaches with left-turn signal	phasing [for 3SG, use maximum value of 3]		1
Type of left-turn signal phasing for Leg #1		Permissive	Permissive
Type of left-turn signal phasing for Leg #2			Protected
Type of left-turn signal phasing for Leg #3			Permissive
Type of left-turn signal phasing for Leg #4	(if applicable)		Permissive
	ed prohibited [for 3SG, use maximum value of 3]	0	0
Intersection red light cameras (present/not	present)	Not Present	Not Present
Sum of all pedestrian crossing volumes (F	edVol) Signalized intersections only		108
Maximum number of lanes crossed by a pe	edestrian (n _{lanesx})		7
Number of bus stops within 300 m (1,000 f	/	0	4
Schools within 300 m (1,000 ft) of the inter-	\ \	Not Present	Not Present
Number of alcohol sales establishments wi	thin 300 m (1.000 ft) of the intersection	0	1

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections										
(1)	(2)	(3)	(4)	(5)	(6)	(7)					
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF					
	Phasing										
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}					
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)					
0.81	1.00	0.92	1.00	0.91	1.00	0.68					

		Worksheet	2C Multiple-	Vehicle Collisions by Sever	rity Level for Urban	and Suburban Arterial I	ntersections			
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
Crash Severity Level	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
-				Parameter, k	Initial N _{bimv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bimv}
	fr	om Table 12-1	0	from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)
	а	b	С	Holli Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)
Total	-10.99	1.07	0.23	0.39	15.403	1.000	15.403	0.68	1.00	10.466
Fotal and Injury (FI)	-13.14	1.18	0.22	0.33	5.457	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	5.634	0.68	1.00	3.828
Fatal and Injury (FI)	-13.14	1.10	0.22	0.33	5.457	0.366	5.034	0.00	1.00	3.020
Property Damage Only	44.00	4.00	0.04	0.44	0.400	(5) _{TOTAL} -(5) _{FI}	0.700	0.00	4.00	0.000
(PDO)	-11.02	1.02	0.24	0.44	9.462	0.634	9.769	0.68	1.00	6.638

	Worksheet 2D Multiple-	Vehicle Collisions by Collis	sion Type for Urban and Suburb	an Arterial Intersections		
(1)	(2)	(3)	(4)	(5)	(6)	
Collision Type	Proportion of Collision Type _(FI)	Predicted N bimv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv (TOTAL)} (crashes/year)	
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C	
Total	1.000	3.828	1.000	6.638	10.466	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Rear-end collision	0.450	1.723	0.483	3.206	4.929	
Head-on collision	0.049	0.188	0.030	0.199	0.387	
Angle collision	0.347	1.328	0.244	1.620	2.948	
Sideswipe	0.099	0.379	0.032	0.212	0.591	
Other multiple-vehicle collision	0.055	0.211	0.211	1.401	1.611	

		Worksheet	2E Single-V	ehicle Collisions by Severi	ty Level for Urban	and Suburban Arterial In	tersections			
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
			Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}	
Crash Severity Level	from Table 12-12				from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)
	а	b	С	from Table 12-12 (F	(FI) from Eqn. 12-		(4)TOTAL (0)	Worksheet 2B		(0) (1) (0)
	а	Б	· ·		24 or 12-27					
Total	-10.21	0.68	0.27	0.36	0.678	1.000	0.678	0.68	1.00	0.461
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.138	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.137	0.68	1.00	0.093
Fatal and injury (FI)	-9.25	0.43	0.29	0.09	0.136	0.202	0.137	0.00	1.00	0.093
Property Damage Only	44.04	0.70	0.05	0.44	0.546	(5) _{TOTAL} -(5) _{FI}	0.544	0.60	4.00	0.260
(PDO)	-11.34	0.78	0.25	0.44	0.546	0.798	0.541	0.68	1.00	0.368

	Worksheet 2F Single-V	ehicle Collisions by Collis	ion Type for Urban and Suburba	n Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bisv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv (TOTAL)} (crashes/year)
	from Table 12-13	(9) _{FI} from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.093	1.000	0.368	0.461
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.001	0.001
Collision with fixed object	0.744	0.069	0.870	0.320	0.389
Collision with other object	0.072	0.007	0.070	0.026	0.032
Other single-vehicle collision	0.040	0.004	0.023	0.008	0.012
Single-vehicle noncollision	0.141	0.013	0.034	0.013	0.026

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(2)	(3)	(4)	(5)	(7)*				
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}				
Clash Severity Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total									
Fatal and injury (FI)				-					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections									
(1)	(1) (2) (3) (4)									
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF							
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CiviF							
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)							
4.15	1.00	1.12	4.65							

	Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections										
(1)	(2)					(3)	(4)	(5)	(6)	(7)	
Crash Severity Level	SPF Coefficients			Overdispersion	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}			
Crash Seventy Level		from Table 12-14					from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)	
	а	b	С	d	е		Hom Equation 12-29	(4) HOIH WORKSHEEL ZIT		(4) (3) (0)	
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.038	4.65	1.00	0.179	
Fatal and Injury (FI)							1		1.00	0.179	

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(5)	(7)*					
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}				
Crash Seventy Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)				
Total	10.466	0.461	10.927	0.015	0.164				
Fatal and injury (FI)				-	0.164				

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

(1)	(2)	(3)	(4)
· · · · · · · · · · · · · · · · · · ·	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE		• •
Rear-end collisions (from Worksheet 2D)	1.723	3.206	4.929
Head-on collisions (from Worksheet 2D)	0.188	0.199	0.387
Angle collisions (from Worksheet 2D)	1.328	1.620	2.948
Sideswipe (from Worksheet 2D)	0.379	0.212	0.591
Other multiple-vehicle collision (from Worksheet 2D)	0.211	1.401	1.611
Subtotal	3.828	6.638	10.466
	SINGLE-VEHICLE		
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.001	0.001
Collision with fixed object (from Worksheet 2F)	0.069	0.320	0.389
Collision with other object (from Worksheet 2F)	0.007	0.026	0.032
Other single-vehicle collision (from Worksheet 2F)	0.004	0.008	0.012
Single-vehicle noncollision (from Worksheet 2F)	0.013	0.013	0.026
Collision with pedestrian (from Worksheet 2G or 2I)	0.179	0.000	0.179
Collision with bicycle (from Worksheet 2J)	0.164	0.000	0.164
Subtotal	0.435	0.368	0.803
Total	4.263	7.006	11.269

Worksheet 2L Summary Res	ults for Urban and Suburban Arterial Intersections
(1)	(2)
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)
	(Total) from Worksheet 2K
Total	11.3
Fatal and injury (FI)	4.3
Property damage only (PDO)	7.0

Worksheet	1A General lı	nformation	and Input Da	ata for Urban and Suburba	n Roadway	Segments		
General Information			-	Location Information				
Analyst		ST		Roadway		MD 28		
Agency or Company		ATCS		Roadway Section		250 ft east of Hurley Ave. to 250 ft west of I-270 Ramp		
Date Performed		06/08/20		Jurisdiction		Montgomery County		
				Analysis Year		2045		
Input Data			Base Conditions		Site Conditions			
Roadway type (2U, 3T, 4U, 4D, ST)						4D		
Length of segment, L (mi)						0.05		
AADT (veh/day)	$AADT_{MAX} =$	66,000	(veh/day)			52,977		
Type of on-street parking (none/parallel/angle)				None		None		
Proportion of curb length with on-street parking						0		
Median width (ft) - for divided only				15		10		
Lighting (present / not present)				Not Present		Present		
Auto speed enforcement (present / not present)				Not Present		Not Present		
Major commercial driveways (number)						0		
Minor commercial driveways (number)						1		
Major industrial / institutional driveways (number)						0		
Minor industrial / institutional driveways (number)						0		
Major residential driveways (number)						0		
Minor residential driveways (number)						0		
Other driveways (number)						0		
Speed Category						Posted Speed Greater than 30 mph		
Roadside fixed object density (fixed objects / mi)				0		360		
Offset to roadside fixed objects (ft) [If greater than 30 or Not Pr	esent, input 30]			30		18		
Calibration Factor, Cr				1.00		1.00		

	Worksheet 1B Crash Modification Factors for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)					
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF					
CMF 1r	CMF 2r	CMF 3r	CMF 4r	CMF 5r	CMF comb					
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)					
1.00	1.75	1.01	0.91	1.00	1.61					

	Worksheet 1C Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments										
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Crash Severity Level	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
-			Parameter, k	Initial N _{brmv}	Crashes	N_{brmv}	CMFs	Factor, Cr	N_{brmv}		
	from Ta	ble 12-3	from Table 12-3	from Equation 12-10		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)		
	a	b	IIOIII Table 12-3	IIOIII Equation 12-10		(+)TOTAL (3)	Worksheet 1B		(0) (1) (0)		
Total	-12.34	1.36	1.32	0.581	1.000	0.581	1.61	1.00	0.938		
Fatal and Injury (FI)	-12.76	1.28	1.31	0.160	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.152	1.61	1.00	0.245		
i atai and injury (i i)	-12.70	1.20	1.51	0.100	0.262	0.132	1.01	1.00	0.243		
Property Parence Only (PPO)	40.04	4.20	4.24	0.450	(5) _{TOTAL} -(5) _{FI}	0.400	1.61	1.00	0.602		
Property Damage Only (PDO)	-12.81	1.38	1.34	0.452	0.738	0.429	1.61	1.00	0.693		

Wor	rksheet 1D Multiple-Vehicle No	ndriveway Collisions by	Collision Type for Urban an	d Suburban Roadway Se	egments	
(1)	(2)	(3)	(4)	(5)	(6)	
Collision Type	Proportion of Collision Type _(FI)	Predicted N brmv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N brmv (PDO) (crashes/year)	Predicted N _{brmv (TOTAL)} (crashes/year)	
	from Table 12-4	(9)FI from Worksheet 1C	from Table 12-4	(9)PDO from Worksheet 1C	(9)TOTAL from Worksheet 1C	
Total	1.000	0.245	1.000	0.693	0.938	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Rear-end collision	0.832	0.204	0.662	0.458	0.663	
Head-on collision	0.020	0.005	0.007	0.005	0.010	
Angle collision	0.040	0.010	0.036	0.025	0.035	
Sideswipe, same direction	0.050	0.012	0.223	0.154	0.167	
Sideswipe, opposite direction	0.010	0.002	0.001	0.001	0.003	
Other multiple-vehicle collision	0.048	0.012	0.071	0.049	0.061	

	Worksheet 1E Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments												
(1)	(2)		(2)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted				
Crash Severity Level			Parameter, k	Initial N _{brsv}	Crashes	N_{brsv}	CMFs	Factor, Cr	N _{brsv}				
Clasii Severity Level	from Ta	ble 12-5	from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)				
	а	b	Hom rable 12-3	Hom Equation 12-15		(T)TOTAL (O)	Worksheet 1B		(0) (1) (0)				
Total	-5.05	0.47	0.86	0.053	1.000	0.053	1.61	1.00	0.086				
Fatal and Injury (FI)	-8.71	0.66	0.28	0.011	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.011	1.61	1.00	0.017				
i atai and injury (i i)	-0.71	0.00	0.20	0.011	0.200	0.011	1.01	1.00	0.017				
Property Democra Only (PDO)	5.04	0.45	1.06	0.042	(5) _{TOTAL} -(5) _{FI}	0.042	1.61	4.00	0.000				
Property Damage Only (PDO)	-5.04	0.45	1.06	0.043	0.800	0.043	1.61	1.00	0.069				

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(F1)	Predicted N _{brsv} (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N brsv (PDO) (crashes/year)	Predicted N _{brsv (TOTAL)} (crashes/year)
,	from Table 12-6	(9) _{FI} from Worksheet 1E	from Table 12-6	(9)PDO from Worksheet 1E	(9)TOTAL from Worksheet 1E
Total	1.000	0.017	1.000	0.069	0.086
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.001	0.000	0.063	0.004	0.004
Collision with fixed object	0.500	0.009	0.813	0.056	0.064
Collision with other object	0.028	0.000	0.016	0.001	0.002
Other single-vehicle collision	0.471	0.008	0.108	0.007	0.016

Work	sheet 1G Multiple-Vehicle Drive	way-Related Collisions by	y Driveway Type for Urban	and Suburban Roadway Segments	
(1)	(2)	(3)	(4)	(5)	(6)
Drivoway Type	Number of driveways,	Crashes per driveway Number of driveways, per year, N _i		Initial N _{brdwy}	Overdispersion parameter, k
Driveway Type	n _j	from Table 12-7	from Table 12-7	Equation 12-16	from Table 12-7
		HOIH TABLE 12-7	HOIII Table 12-7	n _j * N _j * (AADT/15,000) ^t	IIOIII Table 12-7
Major commercial	0	0.033	1.106	0.000	
Minor commercial	1	0.011	1.106	0.044	
Major industrial/institutional	0	0.036	1.106	0.000	
Minor industrial/institutional	0	0.005	1.106	0.000	
Major residential	0	0.018	1.106	0.000	
Minor residential	0	0.003	1.106	0.000	
Other	0	0.005	1.106	0.000	
Total				0.044	1.39

Worksheet 1H Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments									
(1)	(2)	(2) (3) (4) (5) (6)		(6)	(7)				
Crash Severity Level	Initial N _{brdwy}		Adjusted N _{brdwy}	Combined CMFs Calibration factor, C,		Predicted N _{brdwy}			
Crash Severity Level	(5) _{TOTAL} from Worksheet 1G	from Table 12-7	(2) _{TOTAL} * (3)	(6) from Worksheet 1B	, ,	(4)*(5)*(6)			
Total	0.044	1.000	0.044	1.61	1.00	0.072			
Fatal and injury (FI)		0.284	0.013	1.61	1.00	0.020			
Property damage only (PDO)		0.716	0.032	1.61	1.00	0.051			

	Worksheet 1I Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)	(8)*				
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{pedr}	Predicted N _{pedr}				
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8	(5)*(6)				
Total	0.938	0.086	0.072	1.095	0.019	0.021				
atal and injury (FI)						0.021				

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-19

	Worksheet 1J Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(8)*			
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{biker}	Predicted N _{biker}			
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9	(5)*(6)			
Total	0.938	0.086	0.072	1.095	0.005	0.005			
Fatal and injury (FI)						0.005			

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-20

(1)	(2)	(3)	(4)
· · · · · · · · · · · · · · · · · · ·	Fatal and injury (FI)	Property damage only (PDO)	Total
Na III a la constante de la co	(3) from Worksheet 1D and 1F;	(5) from Worksheet 1D and 1F; and	(6) from Worksheet 1D and 1F;
Collision type	(7) from Worksheet 1H; and	(7) from Worksheet 1H	(7) from Worksheet 1H; and
	(8) from Worksheet 1I and 1J		(8) from Worksheet 1I and 1J
	MULTIPLE-VEHICLE	•	
Rear-end collisions (from Worksheet 1D)	0.204	0.458	0.663
Head-on collisions (from Worksheet 1D)	0.005	0.005	0.010
Angle collisions (from Worksheet 1D)	0.010	0.025	0.035
Sideswipe, same direction (from Worksheet 1D)	0.012	0.154	0.167
Sideswipe, opposite direction (from Worksheet 1D)	0.002	0.001	0.003
Oriveway-related collisions (from Worksheet 1H)	0.020	0.051	0.072
Other multiple-vehicle collision (from Worksheet 1D)	0.012	0.049	0.061
Subtotal	0.266	0.744	1.010
	SINGLE-VEHICLE		•
Collision with animal (from Worksheet 1F)	0.000	0.004	0.004
Collision with fixed object (from Worksheet 1F)	0.009	0.056	0.064
Collision with other object (from Worksheet 1F)	0.000	0.001	0.002
Other single-vehicle collision (from Worksheet 1F)	0.008	0.007	0.016
Collision with pedestrian (from Worksheet 1I)	0.021	0.000	0.021
Collision with bicycle (from Worksheet 1J)	0.005	0.000	0.005
Subtotal	0.043	0.069	0.112
- Total	0.309	0.813	1.122

V	Worksheet 1L Summary Results for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)							
Crash Severity Level	Predicted average crash frequency, N predicted rs (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)							
•	(Total) from Worksheet 1K		(2) / (3)							
Total	1.1	0.05	22.4							
Fatal and injury (FI)	0.3	0.05	6.2							
Property damage only (PDO)	0.8	0.05	16.3							

	Worksheet 2A General Information and Input	Data for Orban and Suburban Arti				
	Information		Location Information			
Analyst	ST	Roadway	MD 28			
Agency or Company	ATCS	Intersection	MD 28 at SB I-270 Ramp			
Date Performed	06/08/20	Jurisdiction	Montgomery County			
		Analysis Year	2045			
•	ut Data	Base Conditions	Site Conditions			
Intersection type (3ST, 3SG, 4ST, 4SG)			3SG			
AADT _{major} (veh/day)	$AADT_{MAX} = 58,100 (veh/day)$		53,961			
AADT _{minor} (veh/day)	$AADT_{MAX} = 16,400 (veh/day)$		8,432			
Intersection lighting (present/not present)		Not Present	Present			
Calibration factor, C _i		1.00	1.00			
Data for unsignalized intersections only:			=			
Number of major-road approaches with left	-turn lanes (0,1,2)	0	0			
Number of major-road approaches with rig	nt-turn lanes (0,1,2)	0	0			
Data for signalized intersections only:			-			
Number of approaches with left-turn lanes	(0,1,2,3,4) [for 3SG, use maximum value of 3]	0	1			
Number of approaches with right-turn lanes	s (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	2			
Number of approaches with left-turn signal	phasing [for 3SG, use maximum value of 3]		1			
Type of left-turn signal phasing for Leg #1		Permissive	Not Applicable			
Type of left-turn signal phasing for Leg #2			Not Applicable			
Type of left-turn signal phasing for Leg #3			Protected			
Type of left-turn signal phasing for Leg #4	(if applicable)		Not Applicable			
	ed prohibited [for 3SG, use maximum value of 3]	0	0			
Intersection red light cameras (present/not		Not Present	Not Present			
Sum of all pedestrian crossing volumes (P			82			
Maximum number of lanes crossed by a pe	(Idifesk)		6			
Number of bus stops within 300 m (1,000 f	,	0	0			
Schools within 300 m (1,000 ft) of the inter-	(1 /	Not Present	Not Present			
Number of alcohol sales establishments wi	thin 300 m (1,000 ft) of the intersection	0	0			

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections									
(1)	(2)	(2) (3)		(5)	(6)	(7)				
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF				
	Phasing									
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}				
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)				
0.93	0.99	0.92	1.00	0.91	1.00	0.77				

		Worksheet	2C Multiple-	Vehicle Collisions by Seve	rity Level for Urban	and Suburban Arterial I	ntersections				
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
Crash Severity Level	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
				Parameter, k	Initial N _{bimv}	Crashes	N _{bimv}	CMFs	Factor, C _i	N_{bimv}	
	fr	om Table 12-1	0	from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from	Ī	(6)*(7)*(8)	
	а	b	С	IIOIII Table 12-10	21		(T)TOTAL (S)	Worksheet 2B		(0) (1) (0)	
Total	-12.13	1.11	0.26	0.33	10.124	1.000	10.124	0.77	1.00	7.823	
Fotal and Injury (FI)	11 50	-11.58	1.02	0.17	0.30	0.30 2.917	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	3.090	0.77	1.00	2.388
Fatal and Injury (FI)	-11.50	1.02	0.17	0.30	2.917	0.305	3.090	0.77	1.00	2.300	
Property Damage Only	-13.24	1.14	0.30	0.36	6.642	(5) _{TOTAL} -(5) _{FI}	7.034	0.77	1.00	5.436	
(PDO)	-13.24	1.14	0.30	0.36	0.042	0.695	7.034	0.77	1.00	5.430	

	Worksheet 2D Multiple-	Vehicle Collisions by Collis	sion Type for Urban and Suburb	an Arterial Intersections	
(1)	(2)	(3)	(3) (4) (5)		(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N bimv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv} (TOTAL) (crashes/year)
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C
Total	1.000	2.388	1.000	5.436	7.823
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.549	1.311	0.546	2.968	4.279
Head-on collision	0.038	0.091	0.020	0.109	0.199
Angle collision	0.280	0.669	0.204	1.109	1.777
Sideswipe	0.076	0.181	0.032	0.174	0.355
Other multiple-vehicle collision	0.057	0.136	0.198	1.076	1.212

		Worksheet	2E Single-\	ehicle Collisions by Seve	rity Level for Urban	and Suburban Arterial In	tersections			
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
			Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}	
Crash Severity Level	fr	om Table 12-1			from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)
		h		from Table 12-12	(FI) from Eqn. 12-		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)
	а	b	С		24 or 12-27					
Total	-9.02	0.42	0.40	0.36	0.437	1.000	0.437	0.77	1.00	0.338
Fatal and Injury (FI)	-9.75	0.27	0.51	0.24	0.111	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.117	0.77	1.00	0.091
ratar and injury (FI)	-9.75	0.27	0.51	0.24	0.111	0.268	0.117	0.77	1.00	0.091
Property Damage Only	0.00	0.45	0.22	0.52	0.202	(5) _{TOTAL} -(5) _{FI}	0.220	0.77	1.00	0.047
(PDO)	-9.08	0.45	0.33	0.53	0.303	0.732	0.320	0.77	1.00	0.247

	Worksheet 2F Single-V	ehicle Collisions by Collisi	ion Type for Urban and Suburba	n Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bisv} (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv (TOTAL)} (crashes/year)
	from Table 12-13	(9)FI from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.091	1.000	0.247	0.338
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.001	0.000	0.003	0.001	0.001
Collision with fixed object	0.653	0.059	0.895	0.221	0.280
Collision with other object	0.091	0.008	0.069	0.017	0.025
Other single-vehicle collision	0.045	0.004	0.018	0.004	0.009
Single-vehicle noncollision	0.209	0.019	0.014	0.003	0.022

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(2)	(3)	(4)	(5)	(7)*				
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}				
Clash Severity Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total									
Fatal and injury (FI)				-					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections								
(1)	(1) (2) (3) (4)								
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF						
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CMF						
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)						
1.00	1.00	1.00	1.00						

Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections												
(1)	(2)			(3)	(4)	(5)	(6)	(7)				
Crash Severity Level	SPF Coefficients			Overdispersion	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}				
Crash Seventy Level		from Table 12-14				Parameter, k	from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)		
	а	b	С	d	е		IIOIII Equation 12-25	(4) HOITI WORKSHEET ZIT		(4) (3) (0)		
Total	-6.60	0.05	0.24	0.41	0.09	0.52	0.016	1.00	1.00	0.016		
Fatal and Injury (FI)									1.00	0.016		

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(7)*				
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}				
Crash Seventy Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)				
Total	7.823	0.338	8.161	0.011	0.090				
Fatal and injury (FI)					0.090				

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksr	neet 2K Crash Severity Distribution for Urban a	nd Suburban Arterial Intersections	
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE	·	• • •
Rear-end collisions (from Worksheet 2D)	1.311	2.968	4.279
Head-on collisions (from Worksheet 2D)	0.091	0.109	0.199
Angle collisions (from Worksheet 2D)	0.669	1.109	1.777
Sideswipe (from Worksheet 2D)	0.181	0.174	0.355
Other multiple-vehicle collision (from Worksheet 2D)	0.136	1.076	1.212
Subtotal	2.388	5.436	7.823
	SINGLE-VEHICLE	·	
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.001	0.001
Collision with fixed object (from Worksheet 2F)	0.059	0.221	0.280
Collision with other object (from Worksheet 2F)	0.008	0.017	0.025
Other single-vehicle collision (from Worksheet 2F)	0.004	0.004	0.009
Single-vehicle noncollision (from Worksheet 2F)	0.019	0.003	0.022
Collision with pedestrian (from Worksheet 2G or 2I)	0.016	0.000	0.016
Collision with bicycle (from Worksheet 2J)	0.090	0.000	0.090
Subtotal	0.196	0.247	0.443
Total	2.584	5.683	8.267

Worksheet 2L Summary Resu	Worksheet 2L Summary Results for Urban and Suburban Arterial Intersections							
(1)	(2)							
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)							
	(Total) from Worksheet 2K							
Total	8.3							
Fatal and injury (FI)	2.6							
Property damage only (PDO)	5.7							

Worksheet	1A General Informatio	n and Input D	ata for Urban and Suburba	n Roadway	/ Segments	
General Information			Location Information			
Analyst	ST		Roadway		MD 28	
Agency or Company	ATCS		Roadway Section		250 ft east of SB I-270 Ramp to 250 ft west of Nelson St.	
Date Performed	06/08/20		Jurisdiction		Montgomery County	
			Analysis Year		2045	
Input Data			Base Conditions		Site Conditions	
Roadway type (2U, 3T, 4U, 4D, ST)					4D	
Length of segment, L (mi)					0.25	
AADT (veh/day)	$AADT_{MAX} = 66,000$	(veh/day)			33,100	
Type of on-street parking (none/parallel/angle)			None		None	
Proportion of curb length with on-street parking			-		0	
Median width (ft) - for divided only			15		15	
Lighting (present / not present)			Not Present		Present	
Auto speed enforcement (present / not present)			Not Present	Not Present		
Major commercial driveways (number)					0	
Minor commercial driveways (number)					0	
Major industrial / institutional driveways (number)					0	
Minor industrial / institutional driveways (number)					0	
Major residential driveways (number)					0	
Minor residential driveways (number)					0	
Other driveways (number)					0	
Speed Category					Posted Speed Greater than 30 mph	
Roadside fixed object density (fixed objects / mi)			0		112	
Offset to roadside fixed objects (ft) [If greater than 30 or Not Pi	resent, input 30]		30		11	
Calibration Factor, Cr			1.00		1.00	

Worksheet 1B Crash Modification Factors for Urban and Suburban Roadway Segments										
(1)	(2)	(3)	(4)	(5)	(6)					
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF					
CMF 1r	CMF 2r	CMF 3r	CMF 4r	CMF 5r	CMF comb					
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)					
1.00	1.29	1.00	0.91	1.00	1.18					

	Worksheet 1C Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments										
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Crash Severity Level	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
			Parameter, k	Initial N _{brmv}	Crashes	N_{brmv}	CMFs	Factor, Cr	N _{brmv}		
	from Ta	ble 12-3	from Table 12-3	from Equation 12-10		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)		
	а	b	Holli Table 12-3	IIOIII Equation 12-10		(4)TOTAL (3)	Worksheet 1B		(0) (1) (0)		
Total	-12.34	1.36	1.32	1.534	1.000	1.534	1.18	1.00	1.813		
Fotol and Injury (FI)	-12.76	1.28	1.31	0.438	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.415	1.18	1.00	0.491		
Fatal and Injury (FI)	-12.70	1.20	1.31	0.438	0.271	0.415	1.10	1.00	0.491		
Property Democra Only (PDO)	40.04	4.20	4.04	4.400	(5) _{TOTAL} -(5) _{FI}	4.440	1.10	4.00	4 222		
Property Damage Only (PDO)	-12.81	1.38	1.34	1.180	0.729	1.118	1.18	1.00	1.322		

Wo	rksheet 1D Multiple-Vehicle No	ndriveway Collisions by	Collision Type for Urban an	id Suburban Roadway Se	egments
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N brmv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N brmv (PDO) (crashes/year)	Predicted N _{brmv (TOTAL)} (crashes/year)
	from Table 12-4	(9)FI from Worksheet 1C	from Table 12-4	(9)PDO from Worksheet 1C	(9)TOTAL from Worksheet 1C
Total	1.000	0.491	1.000	1.322	1.813
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.832	0.409	0.662	0.875	1.284
Head-on collision	0.020	0.010	0.007	0.009	0.019
Angle collision	0.040	0.020	0.036	0.048	0.067
Sideswipe, same direction	0.050	0.025	0.223	0.295	0.319
Sideswipe, opposite direction	0.010	0.005	0.001	0.001	0.006
Other multiple-vehicle collision	0.048	0.024	0.071	0.094	0.117

	Worksheet 1E Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments										
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
	SPF Coe	efficients	Overdispersion	Initial N _{brsv}	Proportion of Total Crashes	Adjusted N _{brsv}	Combined CMFs	Calibration Factor, Cr	Predicted N _{brsv}		
Crash Severity Level	from Ta	ble 12-5 b	Parameter, k from Table 12-5	from Equation 12-13	Crasties	(4) _{TOTAL} *(5)	(6) from Worksheet 1B	ractor, Cr	(6)*(7)*(8)		
Total	-5.05	0.47	0.86	0.213	1.000	0.213	1.18	1.00	0.252		
Fatal and Injury (FI)	-8.71	0.66	0.28	0.040	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.185	0.039	1.18	1.00	0.047		
Property Damage Only (PDO)	-5.04	0.45	1.06	0.175	(5) _{TOTAL} -(5) _{FI} 0.815	0.174	1.18	1.00	0.206		

(1)	(2)	(3)	(4)	(5)	(6)	
Collision Type	Proportion of Collision Type _(FI)	Illision Predicted N brsv (FI) Proportion of Collis (crashes/year) Type (PDO)		Predicted N brsv (PDO) (crashes/year)	Predicted N _{brsv (TOTAL)} (crashes/year)	
,	from Table 12-6	(9)FI from Worksheet 1E	from Table 12-6	(9)PDO from Worksheet 1E	(9)TOTAL from Worksheet 1E	
Total	1.000	0.047	1.000	0.206	0.252	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Collision with animal	0.001	0.000	0.063	0.013	0.013	
Collision with fixed object	0.500	0.023	0.813	0.167	0.190	
Collision with other object	0.028	0.001	0.016	0.003	0.005	
Other single-vehicle collision	0.471	0.022	0.108	0.022	0.044	

Workshee	t 1G Multiple-Vehicle Drive	way-Related Collisions by	y Driveway Type for Urban	and Suburban Roadway Segments			
(1)	(2)	(3)	(4)	(5)	(6)		
Drivougy Type	Number of driveways,	Crashes per driveway ber of driveways, per year, N _i		Initial N _{brdwy}	Overdispersion parameter, k		
Driveway Type	n _i	from Table 12-7	from Table 12-7	Equation 12-16	from Table 12-7		
	·	ITOTTI TADIE 12-7	ITOTTI TABLE 12-7	n _j * N _j * (AADT/15,000) ^t	IIOIII Table 12-7		
Major commercial	0	0.033	1.106	0.000			
Minor commercial	0	0.011	1.106	0.000			
Major industrial/institutional	0	0.036	1.106	0.000			
Minor industrial/institutional	0	0.005	1.106	0.000			
Major residential	0	0.018	1.106	0.000			
Minor residential	0	0.003	1.106	0.000			
Other	0	0.005	1.106	0.000			
Total				0.000	1.39		

Worksheet 1H Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments									
(1)	(2)	(2) (3) (4) (5) (6)		(6)	(7)				
Crash Severity Level	Initial N _{brdwy}	Proportion of total crashes (f _{dwy})	Adjusted N _{brdwy}	Combined CMFs	Calibration factor, C,	Predicted N _{brdwy}			
	(5) _{TOTAL} from Worksheet 1G	from Table 12-7	rom Table 12-7 (2) _{TOTAL} * (3)		, ,	(4)*(5)*(6)			
Total	0.000	1.000	0.000	1.18	1.00	0.000			
Fatal and injury (FI)		0.284	0.000	1.18	1.00	0.000			
Property damage only (PDO)		0.716	0.000	1.18	1.00	0.000			

Worksheet 1I Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)	(8)*			
Crash Severity Level	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{pedr}	Predicted N _{pedr}			
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8	(5)*(6)			
otal	1.813	0.252	0.000	2.066	0.019	0.039			
atal and injury (FI)				==		0.039			

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-19

	Worksheet 1J Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(8)*			
Crash Severity Level	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{biker}	Predicted N _{biker}			
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9	(5)*(6)			
Total	1.813	0.252	0.000	2.066	0.005	0.010			
Fatal and injury (FI)						0.010			

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-20

	et 1K Crash Severity Distribution for Urban a	inu Suburban Roauway Segments	
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 1D and 1F;	(5) from Worksheet 1D and 1F; and	(6) from Worksheet 1D and 1F;
Comsion type	(7) from Worksheet 1H; and	(7) from Worksheet 1H	(7) from Worksheet 1H; and
	(8) from Worksheet 1I and 1J		(8) from Worksheet 1I and 1J
	MULTIPLE-VEHICLE	•	
Rear-end collisions (from Worksheet 1D)	0.409	0.875	1.284
Head-on collisions (from Worksheet 1D)	0.010	0.009	0.019
Angle collisions (from Worksheet 1D)	0.020	0.048	0.067
Sideswipe, same direction (from Worksheet 1D)	0.025	0.295	0.319
Sideswipe, opposite direction (from Worksheet 1D)	0.005	0.001	0.006
Driveway-related collisions (from Worksheet 1H)	0.000	0.000	0.000
Other multiple-vehicle collision (from Worksheet 1D)	0.024	0.094	0.117
Subtotal	0.491	1.322	1.813
	SINGLE-VEHICLE		
Collision with animal (from Worksheet 1F)	0.000	0.013	0.013
Collision with fixed object (from Worksheet 1F)	0.023	0.167	0.190
Collision with other object (from Worksheet 1F)	0.001	0.003	0.005
Other single-vehicle collision (from Worksheet 1F)	0.022	0.022	0.044
Collision with pedestrian (from Worksheet 1I)	0.039	0.000	0.039
Collision with bicycle (from Worksheet 1J)	0.010	0.000	0.010
Subtotal	0.096	0.206	0.302
Total	0.587	1.528	2.115

Worksheet 1L Summary Results for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)						
Crash Severity Level	Predicted average crash frequency, N predicted rs (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)						
	(Total) from Worksheet 1K		(2) / (3)						
Total	2.1	0.25	8.5						
Fatal and injury (FI)	0.6	0.25	2.3						
Property damage only (PDO)	1.5	0.25	6.1						

0	Worksheet 2A General Information and Input ral Information		Location Information		
Analyst	ST	Roadway	MD 28		
Agency or Company	ATCS	Intersection	MD 28 at I-270 Ramp and Nelson St.		
Date Performed	06/08/20	Jurisdiction	Montgomery County		
	12.1	Analysis Year	2045		
Intersection type (3ST, 3SG, 4ST, 4SG)	nput Data	Base Conditions	Site Conditions 4SG		
3. (, , , , , , , , , , , , , , , , , ,	$AADT_{MAX} = 67,700 (veh/day)$		27,538		
AADT major (veh/day)		-	·		
AADT _{minor} (veh/day)	$AADT_{MAX} = 33,400 (veh/day)$		9,337		
Intersection lighting (present/not present)		Not Present	Present		
Calibration factor, C _i		1.00	1.00		
Data for unsignalized intersections only:					
Number of major-road approaches with I	eft-turn lanes (0,1,2)	0	0		
Number of major-road approaches with r	ight-turn lanes (0,1,2)	0	0		
Data for signalized intersections only:					
Number of approaches with left-turn lane	es (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	2		
Number of approaches with right-turn lar	nes (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	2		
Number of approaches with left-turn sign	al phasing [for 3SG, use maximum value of 3]		2		
Type of left-turn signal phasing for Leg #	1	Permissive	Permissive / Protected		
Type of left-turn signal phasing for Leg #	2		Not Applicable		
Type of left-turn signal phasing for Leg #			Not Applicable		
Type of left-turn signal phasing for Leg #	4 (if applicable)		Protected		
Number of approaches with right-turn-on	-red prohibited [for 3SG, use maximum value of 3]	0	0		
Intersection red light cameras (present/n		Not Present	Not Present		
Sum of all pedestrian crossing volumes			82		
Maximum number of lanes crossed by a	pedestrian (n _{lanesx})		6		
Number of bus stops within 300 m (1,000	,	0	2		
Schools within 300 m (1,000 ft) of the int	1 /	Not Present	Not Present		
Number of alcohol sales establishments	within 300 m (1,000 ft) of the intersection	0	0		

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(6)	(7)				
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF				
	Phasing									
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}				
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)				
0.81	0.92	0.92	1.00	0.91	1.00	0.63				

		Worksheet	2C Multiple-	Vehicle Collisions by Seve	rity Level for Urban	and Suburban Arterial I	ntersections			
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
Crash Severity Level	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
-				Parameter, k	Initial N _{bimv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bimv}
	from Table 12-10		from Table 12 10	from Table 12-10 from Equation 12-		(4) _{TOTAL} *(5)	(7) from	Ī	(6)*(7)*(8)	
	а	b	С	IIOIII Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)
Total	-10.99	1.07	0.23	0.39	7.780	1.000	7.780	0.63	1.00	4.873
Fotal and Injuny (FI)	-13.14	1.18	0.22	0.33	2.546	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	2.639	0.00	4.00	1.653
Fatal and Injury (FI)	FI) -13.14 1.18 0.22 0.33 2.546 -	0.339	2.039	0.63	1.00	1.000				
Property Damage Only	-11.02	1.02	0.24	0.44	4.962	(5) _{TOTAL} -(5) _{FI}	5.141	0.63	1.00	3.220
(PDO)	-11.02	1.02	0.24	0.44	4.302	0.661	3.141	0.03	1.00	0.220

	Worksheet 2D Multiple-	Vehicle Collisions by Collis	sion Type for Urban and Suburb	an Arterial Intersections		
(1)	(2)	(3)	(4)	(5)	(6)	
Collision Type	Proportion of Collision Type _(FI)	Predicted N bimv (FI) (crashes/year)			Predicted N _{bimv (TOTAL)} (crashes/year)	
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C	
Total	1.000	1.653	1.000	3.220	4.873	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Rear-end collision	0.450	0.744	0.483	1.555	2.299	
Head-on collision	0.049	0.081	0.030	0.097	0.178	
Angle collision	0.347	0.573	0.244	0.786	1.359	
Sideswipe	0.099	0.164	0.032	0.103	0.267	
Other multiple-vehicle collision	0.055	0.091	0.211	0.679	0.770	

		Worksheet	2E Single-V	ehicle Collisions by Severi	ty Level for Urban	and Suburban Arterial In	tersections			
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
			Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}	
Crash Severity Level	fr	om Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from		(C)*(7)*(0)
	2	b	С	from Table 12-12	(FI) from Eqn. 12-		(+)TOTAL (3)	Worksheet 2B		(6)*(7)*(8)
	а	b	C	·	24 or 12-27					
Total	-10.21	0.68	0.27	0.36	0.454	1.000	0.454	0.63	1.00	0.284
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.110	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.111	0.63	1.00	0.070
Fatal and injury (FI)	-9.25	0.43	0.29	0.09	0.110	0.246	0.111	0.63	1.00	0.070
Property Damage Only	44.04	0.70	0.05	0.44	0.220	(5) _{TOTAL} -(5) _{FI}	0.242	0.63	4.00	0.044
(PDO)	-11.34	0.78	0.25	0.44	0.339	0.754	0.342	0.63	1.00	0.214

	Worksheet 2F Single-V	ehicle Collisions by Collisi	ion Type for Urban and Suburba	n Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N bisv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv (TOTAL)} (crashes/year)
	from Table 12-13	(9)FI from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.070	1.000	0.214	0.284
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.000	0.001
Collision with fixed object	0.744	0.052	0.870	0.187	0.239
Collision with other object	0.072	0.005	0.070	0.015	0.020
Other single-vehicle collision	0.040	0.003	0.023	0.005	0.008
Single-vehicle noncollision	0.141	0.010	0.034	0.007	0.017

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(1) (2) (3) (4) (5)								
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}				
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total				-					
atal and injury (FI)				1					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections									
(1)	(1) (2) (3) (4)									
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF							
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined Civir							
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)							
2.78	1.00	1.00	2.78							

Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections										
(1)	(2)				(3)	(4)	(5)	(6)	(7)	
SPF Coefficients Crash Severity Level			Overdispersion	$N_{pedbase}$	Combined CMF	Calibration	Predicted N _{pedi}			
Crash Severity Level		from Table 12-14				Parameter, k	from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)
	а	b	С	d	е		IIOIII Equation 12-29	(4) HOIH WORKSHEEL ZIT		(4) (3) (0)
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.034	2.78	1.00	0.094
Fatal and Injury (FI)							-		1.00	0.094

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections								
(1)	(2)	(2) (3) (4) (5)						
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}			
Crash Severity Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)			
Total	4.873	0.284	5.157	0.015	0.077			
Fatal and injury (FI)					0.077			

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksr	neet 2K Crash Severity Distribution for Urban a	nd Suburban Arterial Intersections	
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE	·	•
Rear-end collisions (from Worksheet 2D)	0.744	1.555	2.299
Head-on collisions (from Worksheet 2D)	0.081	0.097	0.178
Angle collisions (from Worksheet 2D)	0.573	0.786	1.359
Sideswipe (from Worksheet 2D)	0.164	0.103	0.267
Other multiple-vehicle collision (from Worksheet 2D)	0.091	0.679	0.770
Subtotal	1.653	3.220	4.873
	SINGLE-VEHICLE		•
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.001
Collision with fixed object (from Worksheet 2F)	0.052	0.187	0.239
Collision with other object (from Worksheet 2F)	0.005	0.015	0.020
Other single-vehicle collision (from Worksheet 2F)	0.003	0.005	0.008
Single-vehicle noncollision (from Worksheet 2F)	0.010	0.007	0.017
Collision with pedestrian (from Worksheet 2G or 2I)	0.094	0.000	0.094
Collision with bicycle (from Worksheet 2J)	0.077	0.000	0.077
Subtotal	0.242	0.214	0.456
Total	1,894	3.435	5.329

Worksheet 2L Summary Results for Urban and Suburban Arterial Intersections							
(1)	(2)						
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)						
	(Total) from Worksheet 2K						
Total	5.3						
Fatal and injury (FI)	1.9						
Property damage only (PDO)	3.4						

Worksheet	1A General Info	ormation a	and Input D	ata for Urban and Suburba	n Roadway	Segments	
General Information			-	Location Information			
Analyst		ST		Roadway		MD 28	
Agency or Company		ATCS		Roadway Section		250 ft east of Nelson St. to 250 ft west of Laird St.	
Date Performed	00	6/08/20		Jurisdiction		Montgomery County	
				Analysis Year		2045	
Input Data				Base Conditions		Site Conditions	
Roadway type (2U, 3T, 4U, 4D, ST)						3T	
Length of segment, L (mi)						0.35	
AADT (veh/day)	$AADT_{MAX} =$	32,900	(veh/day)			26,900	
Type of on-street parking (none/parallel/angle)				None		None	
Proportion of curb length with on-street parking						0	
Median width (ft) - for divided only				15		Not Present	
Lighting (present / not present)				Not Present		Present	
Auto speed enforcement (present / not present)				Not Present		Present	
Major commercial driveways (number)						0	
Minor commercial driveways (number)						0	
Major industrial / institutional driveways (number)						0	
Minor industrial / institutional driveways (number)						0	
Major residential driveways (number)						4	
Minor residential driveways (number)						35	
Other driveways (number)					0		
Speed Category					Posted Speed Greater than 30 mph		
Roadside fixed object density (fixed objects / mi)				0		163	
Offset to roadside fixed objects (ft) [If greater than 30 or Not Pr	esent, input 30]			30		17	
Calibration Factor, Cr				1.00		1.00	

Worksheet 1B Crash Modification Factors for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)			
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF			
CMF 1r	CMF 2r	CMF 3r	CMF 4r	CMF 5r	CMF comb			
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)			
1.00	1.31	1.00	0.93	0.95	1.16			

	Worksheet 1C Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments										
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Crash Severity Level	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
			Parameter, k	Initial N _{brmv}	Crashes	N _{brmv}	CMFs	Factor, Cr	N _{brmv}		
	from Table 12-3		from Table 12-3	from Equation 12-10		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)		
	а	b	Hom rable 12-3	Hom Equation 12-10		(+)TOTAL (3)	Worksheet 1B		(0) (1) (0)		
Total	-12.40	1.41	0.66	2.540	1.000	2.540	1.16	1.00	2.958		
Fotal and Injury (FI)	-16.45	1.69	0.59	0.769	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.772	1.16	1.00	0.899		
Fatal and Injury (FI)	-10.45	1.09	0.59	0.769	0.304	0.772	1.10	1.00	0.099		
Property Democra Only (PDO)	44.05	4.00	0.50	4.704	(5) _{TOTAL} -(5) _{FI}	4.767	1.16	4.00	2.050		
Property Damage Only (PDO)	-11.95	1.33	0.59	1.761	0.696	1.767	1.16	1.00	2.059		

Wo	rksheet 1D Multiple-Vehicle No	ndriveway Collisions by	Collision Type for Urban an	id Suburban Roadway Se	egments	
(1)	(2)	(3)	(4)	(5)	(6)	
Collision Type	Proportion of Collision Type _(FI)	Predicted N brmv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N brmv (PDO) (crashes/year)	Predicted N _{brmv (TOTAL)} (crashes/year)	
	from Table 12-4	(9) _{FI} from Worksheet 1C	from Table 12-4	(9)PDO from Worksheet 1C	(9)TOTAL from Worksheet 1C	
Total	1.000	0.899	1.000	2.059	2.958	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Rear-end collision	0.845	0.760	0.842	1.733	2.493	
Head-on collision	0.034	0.031	0.020	0.041	0.072	
Angle collision	0.069	0.062	0.020	0.041	0.103	
Sideswipe, same direction	0.001	0.001	0.078	0.161	0.161	
Sideswipe, opposite direction	0.017	0.015	0.020	0.041	0.056	
Other multiple-vehicle collision	0.034	0.031	0.020	0.041	0.072	

	Worksheet 1E Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments										
(1)	(2)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
	SPF Coefficients		SPF Coefficients Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
Crash Severity Level			Parameter, k	Initial N _{brsv}	Crashes	N_{brsv}	CMFs	Factor, Cr	N_{brsv}		
Clasii Severity Lever	from Ta	ble 12-5	from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)		
	а	b	HOIII TABIC 12-0	Hom Equation 12-15		(T)IOIAL (O)	Worksheet 1B		(0) (1) (0)		
Total	-5.74	0.54	1.37	0.278	1.000	0.278	1.16	1.00	0.323		
Fatal and Injury (FI)	-6.37	0.47	1.06	0.072	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.075	1.16	1.00	0.087		
ratarand injury (i i)	-0.57	0.47	1.00	0.072	0.269	0.073	1.10	1.00	0.007		
Preparty Damage Only (PDO)	-6.29	0.56	1.93	0.196	(5) _{TOTAL} -(5) _{FI}	0.203	1.16	1.00	0.236		
Property Damage Only (PDO)	-0.29	0.50	1.93	0.196	0.731	0.203	1.10	1.00	0.230		

(1)	(2)	(3)	(4)	(5)	(6)	
Collision Type	Proportion of Collision Type _(FI)	lision Predicted N _{brsv} (FI) Proportion of Collision I (crashes/year) Type _(PDO)		Predicted N brsv (PDO) (crashes/year)	Predicted N _{brsv (TOTAL)} (crashes/year)	
,	from Table 12-6	(9) _{FI} from Worksheet 1E	from Table 12-6	(9)PDO from Worksheet 1E	(9)TOTAL from Worksheet 1E	
Total	1.000	0.087	1.000	0.236	0.323	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Collision with animal	0.001	0.000	0.001	0.000	0.000	
Collision with fixed object	0.688	0.060	0.963	0.227	0.287	
Collision with other object	0.001	0.000	0.001	0.000	0.000	
Other single-vehicle collision	0.310	0.027	0.035	0.008	0.035	

Work	sheet 1G Multiple-Vehicle Drive	way-Related Collisions by	y Driveway Type for Urban	and Suburban Roadway Segments	
(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	Number of driveways,	Crashes per driveway per year, N _j	Coefficient for traffic adjustment, t	Initial N _{brdwy}	Overdispersion parameter, k
	n _j	from Table 12-7	from Table 12-7	Equation 12-16	from Table 12-7
		Hom rable 12-7		n _j * N _j * (AADT/15,000) ^t	IIOIII Table 12-7
Major commercial	0	0.102	1.000	0.000	
Minor commercial	0	0.032	1.000	0.000	
Major industrial/institutional	0	0.110	1.000	0.000	
Minor industrial/institutional	0	0.015	1.000	0.000	
Major residential	4	0.053	1.000	0.380	
Minor residential	35	0.010	1.000	0.628	
Other	0	0.016	1.000	0.000	
Total				1.008	1.10

Worksheet 1H Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments									
(1)	(2)	(3) (4) (5) (6)		(6)	(7)				
Crash Severity Level	Initial N _{brdwy}		Adjusted N _{brdwy}	Combined CMFs	Calibration factor, C,	Predicted N _{brdwy}			
Crash Severity Level	(5) _{TOTAL} from Worksheet 1G	from Table 12-7	(2) _{TOTAL} * (3)	(6) from Worksheet 1B	, ·	(4)*(5)*(6)			
Total	1.008	1.000	1.008	1.16	1.00	1.174			
Fatal and injury (FI)		0.243	0.245	1.16	1.00	0.285			
Property damage only (PDO)		0.757	0.763	1.16	1.00	0.889			

	Worksheet 1I Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)	(8)*				
Crash Severity Level	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{pedr}	Predicted N _{pedr}				
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8	(5)*(6)				
Total	2.958	0.323	1.174	4.455	0.013	0.058				
atal and injury (FI)						0.058				

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-19

	Worksheet 1J Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)	(8)*				
Crash Severity Level	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{biker}	Predicted N _{biker}				
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9	(5)*(6)				
Total	2.958	0.323	1.174	4.455	0.007	0.031				
Fatal and injury (FI)						0.031				

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-20

(1)	(2)	(3)	(4)
\ /	Fatal and injury (FI)	Property damage only (PDO)	Total
Na 111-1 4	(3) from Worksheet 1D and 1F;	(5) from Worksheet 1D and 1F; and	(6) from Worksheet 1D and 1F;
Collision type	(7) from Worksheet 1H; and	(7) from Worksheet 1H	(7) from Worksheet 1H; and
	(8) from Worksheet 1I and 1J		(8) from Worksheet 1I and 1J
	MULTIPLE-VEHICLE	•	
Rear-end collisions (from Worksheet 1D)	0.760	1.733	2.493
Head-on collisions (from Worksheet 1D)	0.031	0.041	0.072
Angle collisions (from Worksheet 1D)	0.062	0.041	0.103
Sideswipe, same direction (from Worksheet 1D)	0.001	0.161	0.161
Sideswipe, opposite direction (from Worksheet 1D)	0.015	0.041	0.056
Oriveway-related collisions (from Worksheet 1H)	0.285	0.889	1.174
Other multiple-vehicle collision (from Worksheet 1D)	0.031	0.041	0.072
Subtotal	1.185	2.947	4.132
	SINGLE-VEHICLE		•
Collision with animal (from Worksheet 1F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 1F)	0.060	0.227	0.287
Collision with other object (from Worksheet 1F)	0.000	0.000	0.000
Other single-vehicle collision (from Worksheet 1F)	0.027	0.008	0.035
Collision with pedestrian (from Worksheet 1I)	0.058	0.000	0.058
Collision with bicycle (from Worksheet 1J)	0.031	0.000	0.031
Subtotal	0.176	0.236	0.412
- Fotal	1.361	3.183	4.544

Worksheet 1L Summary Results for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)						
Crash Severity Level	Predicted average crash frequency, N predicted rs (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)						
	(Total) from Worksheet 1K		(2) / (3)						
Total	4.5	0.35	13.0						
Fatal and injury (FI)	1.4	0.35	3.9						
Property damage only (PDO)	3.2	0.35	9.1						

Ganaral	Worksheet 2A General Information and Input Information	Tata ioi oiban ana oabarban Ar	Location Information
	ST	Deadway	
Analyst		Roadway	MD 28
Agency or Company	ATCS	Intersection	MD 28 at Laird St.
Date Performed	06/08/20	Jurisdiction	Montgomery County
	15.1	Analysis Year	2045
Intersection type (3ST, 3SG, 4ST, 4SG)	ut Data	Base Conditions	Site Conditions 4SG
AADT major (veh/day)	$AADT_{MAX} = 67,700 (veh/day)$		28,055
			·
AADT _{minor} (veh/day)	$AADT_{MAX} = 33,400 (veh/day)$		1,274
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C _i		1.00	1.00
Data for unsignalized intersections only:			
Number of major-road approaches with left	-turn lanes (0,1,2)	0	0
Number of major-road approaches with righ	nt-turn lanes (0,1,2)	0	0
Data for signalized intersections only:			-
Number of approaches with left-turn lanes	(0,1,2,3,4) [for 3SG, use maximum value of 3]	0	2
Number of approaches with right-turn lanes	s (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	1
Number of approaches with left-turn signal	phasing [for 3SG, use maximum value of 3]		0
Type of left-turn signal phasing for Leg #1		Permissive	Permissive
Type of left-turn signal phasing for Leg #2			Permissive
Type of left-turn signal phasing for Leg #3			Permissive
Type of left-turn signal phasing for Leg #4 ((if applicable)		Permissive
	ed prohibited [for 3SG, use maximum value of 3]	0	0
Intersection red light cameras (present/not	present)	Not Present	Not Present
Sum of all pedestrian crossing volumes (P	edVol) Signalized intersections only		240
Maximum number of lanes crossed by a pe	edestrian (n _{lanesx})		3
Number of bus stops within 300 m (1,000 ft	t) of the intersection	0	4
Schools within 300 m (1,000 ft) of the inters	(1 /	Not Present	Present
Number of alcohol sales establishments wi	thin 300 m (1,000 ft) of the intersection	0	0

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(6)	(7)				
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF				
	Phasing									
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}				
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)				
0.81	1.00	0.96	1.00	0.91	1.00	0.71				

		Worksheet	2C Multiple-	Vehicle Collisions by Seve	rity Level for Urban	and Suburban Arterial I	ntersections			
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
-				Parameter, k	Initial N _{bimv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bimv}
	from Table 12-10		from Table 12-10	from Equation 12-	(4) _{TOTAL} *(5		(7) from	Ī [(6)*(7)*(9)	
	а	b	С	IIOIII Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(6)*(7)*(8)
Total	-10.99	1.07	0.23	0.39	5.020	1.000	5.020	0.71	1.00	3.555
Fotal and Injury (FI)	12 14	-13.14 1.18 0.22 0.	1.10	0.33	1.679	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	1.751	0.71	4.00	4.040
Fatal and Injury (FI)	-13.14		0.33	1.079	0.349	1.751	0.71	1.00	1.240	
Property Damage Only	44.00	4.00	0.04	0.44	0.405	(5) _{TOTAL} -(5) _{FI}	2.000	0.74	4.00	0.045
(PDO)	-11.02	1.02	0.24	0.44	3.135	0.651	3.269	0.71	1.00	2.315

	Worksheet 2D Multiple-	Vehicle Collisions by Collis	sion Type for Urban and Suburb	an Arterial Intersections			
(1)	(2)	(3)	(4)	(5)			
Collision Type	Proportion of Collision Type _(FI)	Predicted N bimv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv (TOTAL)} (crashes/year)		
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C		
Total	1.000	1.240	1.000	2.315	3.555		
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)		
Rear-end collision	0.450	0.558	0.483	1.118	1.676		
Head-on collision	0.049	0.061	0.030	0.069	0.130		
Angle collision	0.347	0.430	0.244	0.565	0.995		
Sideswipe	0.099	0.123	0.032	0.074	0.197		
Other multiple-vehicle collision	0.055	0.068	0.211	0.488	0.557		

		Worksheet	2E Single-V	ehicle Collisions by Severi	ty Level for Urban	and Suburban Arterial In	tersections			
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
				Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}
Crash Severity Level	fr	om Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)
		h		from Table 12-12	(FI) from Eqn. 12-		(4)TOTAL (0)	Worksheet 2B		(0) (1) (0)
	a b c		24 or 12-27							
Total	-10.21	0.68	0.27	0.36	0.268	1.000	0.268	0.71	1.00	0.190
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.063	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.062	0.71	1.00	0.044
ratai and injury (Fi)	-9.25	0.43	0.29	0.09	0.003	0.230	0.002	0.71	1.00	0.044
Property Damage Only	44.04	0.70	0.05	0.44	0.200	(5) _{TOTAL} -(5) _{FI}	0.207	0.74	4.00	0.446
(PDO)	-11.34	0.78	0.25	0.44	0.209	0.770	0.207	0.71	1.00	0.146

	Worksheet 2F Single-V	ehicle Collisions by Collis	ion Type for Urban and Suburba	n Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N bisv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv} (TOTAL) (crashes/year)
	from Table 12-13	(9)FI from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.044	1.000	0.146	0.190
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.000	0.000
Collision with fixed object	0.744	0.033	0.870	0.127	0.160
Collision with other object	0.072	0.003	0.070	0.010	0.013
Other single-vehicle collision	0.040	0.002	0.023	0.003	0.005
Single-vehicle noncollision	0.141	0.006	0.034	0.005	0.011

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(1) (2) (3) (4) (5)								
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}				
Clash Severity Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total									
Fatal and injury (FI)				-					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections									
(1)	(1) (2) (3) (4)									
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF							
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CiviF							
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)							
4.15	1.35	1.00	5.60							

Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections										
(1)	(2)					(3)	(4)	(5)	(6)	(7)
SPF Coefficients Crash Severity Level			Overdispersion	$N_{pedbase}$	Combined CMF	Calibration	Predicted N _{pedi}			
Crash Seventy Level		from Table 12-14					from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)
	а	b	С	d	е		IIOIII Equation 12-29	(4) HOIH WORKSHEEL ZIT		(4) (3) (0)
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.026	5.60	1.00	0.148
Fatal and Injury (FI)							-		1.00	0.148

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(7)*				
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}				
Crash Severity Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)				
Total	3.555	0.190	3.745	0.015	0.056				
Fatal and injury (FI)		-		-	0.056				

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

WORKSI	neet 2K Crash Severity Distribution for Urban a	nd Suburban Arterial Intersections	-
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE	·	•
Rear-end collisions (from Worksheet 2D)	0.558	1.118	1.676
Head-on collisions (from Worksheet 2D)	0.061	0.069	0.130
Angle collisions (from Worksheet 2D)	0.430	0.565	0.995
Sideswipe (from Worksheet 2D)	0.123	0.074	0.197
Other multiple-vehicle collision (from Worksheet 2D)	0.068	0.488	0.557
Subtotal	1.240	2.315	3.555
	SINGLE-VEHICLE		•
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 2F)	0.033	0.127	0.160
Collision with other object (from Worksheet 2F)	0.003	0.010	0.013
Other single-vehicle collision (from Worksheet 2F)	0.002	0.003	0.005
Single-vehicle noncollision (from Worksheet 2F)	0.006	0.005	0.011
Collision with pedestrian (from Worksheet 2G or 2I)	0.148	0.000	0.148
Collision with bicycle (from Worksheet 2J)	0.056	0.000	0.056
Subtotal	0.248	0.146	0.394
Total	1.488	2.461	3.949

Worksheet 2L Summary Resul	Its for Urban and Suburban Arterial Intersections
(1)	(2)
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)
	(Total) from Worksheet 2K
Total	3.9
Fatal and injury (FI)	1.5
Property damage only (PDO)	2.5

Worksheet	1A General Info	rmation ar	nd Input Da	ata for Urban and Suburba	n Roadway	Segments		
General Information						Location Information		
Analyst		TL		Roadway	MD 117 W Diamond Ave			
Agency or Company	А	ATCS		Roadway Section		I-270 SB On-Ramp to I-270 NB Off-Ramp		
Date Performed	02	2/16/21		Jurisdiction		Montgomery County		
				Analysis Year		2045		
Input Data				Base Conditions		Site Conditions		
Roadway type (2U, 3T, 4U, 4D, ST)	•					4U		
Length of segment, L (mi)						0.09		
AADT (veh/day)	$AADT_{MAX} = $	40,100	(veh/day)			39,324		
Type of on-street parking (none/parallel/angle)				None		None		
Proportion of curb length with on-street parking						0		
Median width (ft) - for divided only				15		Not Present		
Lighting (present / not present)				Not Present		Not Present		
Auto speed enforcement (present / not present)				Not Present		Not Present		
Major commercial driveways (number)						0		
Minor commercial driveways (number)						0		
Major industrial / institutional driveways (number)						0		
Minor industrial / institutional driveways (number)						0		
Major residential driveways (number)						0		
Minor residential driveways (number)						0		
Other driveways (number)						0		
Speed Category						Posted Speed Greater than 30 mph		
Roadside fixed object density (fixed objects / mi)				0		67		
Offset to roadside fixed objects (ft) [If greater than 30 or Not Pr	esent, input 30]			30		10		
Calibration Factor, Cr				1.00		1.00		

Worksheet 1B Crash Modification Factors for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)				
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF				
CMF 1r	CMF 2r	CMF 3r	CMF 4r	CMF 5r	CMF comb				
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)				
1.00	1.18	1.00	1.00	1.00	1.18				

	Worksheet 1C Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments										
(1)	(1) (2)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
			Parameter, k	Initial N _{brmv}	Crashes	N_{brmv}	CMFs	Factor, Cr	N _{brmv}		
	from Table 12-3		from Table 12-3	from Equation 12-10		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)		
	а	b	Hom rable 12-3	IIOIII Equation 12-10		(4)TOTAL (3)	Worksheet 1B		(0) (1) (0)		
Total	-11.63	1.33	1.01	1.033	1.000	1.033	1.18	1.00	1.216		
Fatal and Injury (FI)	-12.08	1.25	0.99	0.283	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.293	1.18	1.00	0.345		
ratar and injury (FI)	-12.00	1.25	0.99	0.263	0.284	0.293	1.10	1.00	0.345		
Dranarty Damage Only (DDO)	40.50	4.20	4.00	0.740	(5) _{TOTAL} -(5) _{FI}	0.740	1.10	1.00	0.074		
Property Damage Only (PDO)	-12.53	1.38	1.08	0.713	0.716	0.740	1.18	1.00	0.871		

Woi	rksheet 1D Multiple-Vehicle No	ndriveway Collisions by	Collision Type for Urban an	d Suburban Roadway Se	gments	
(1)	(2)	(3)	(4)	(5)	(6)	
Collision Type	Proportion of Collision Type(FI)	Predicted N brmv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N brmv (PDO) (crashes/year)	Predicted N _{brmv (TOTAL)} (crashes/yea	
	from Table 12-4	(9) _{FI} from Worksheet 1C	from Table 12-4	(9)PDO from Worksheet 1C	(9)TOTAL from Worksheet 1C	
Total	1.000	0.345	1.000	0.871	1.216	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Rear-end collision	0.511	0.176	0.506	0.441	0.617	
Head-on collision	0.077	0.027	0.004	0.003	0.030	
Angle collision	0.181	0.062	0.130	0.113	0.176	
Sideswipe, same direction	0.093	0.032	0.249	0.217	0.249	
Sideswipe, opposite direction	0.082	0.028	0.031	0.027	0.055	
Other multiple-vehicle collision	0.056	0.019	0.080	0.070	0.089	

	Worksheet 1E Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments										
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
Crash Severity Level			Parameter, k	Initial N _{brsv}	Crashes	N _{brsv}	CMFs	Factor, Cr	N _{brsv}		
Clasii Severity Level	from Ta	ble 12-5	from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)		
	а	b	Holli Table 12-3	nom Equation 12-15		(')TOTAL (O)	Worksheet 1B		(3) (1) (0)		
Total	-7.99	0.81	0.91	0.161	1.000	0.161	1.18	1.00	0.189		
Fatal and Injury (FI)	-7.37	0.61	0.54	0.036	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.034	1.18	1.00	0.040		
ratarana mjury (r 1)	-1.51	0.01	0.54	0.000	0.214	0.054	1.10	1.00	0.040		
Preparty Damage Only (PDO)	-8.50	0.84	0.97	0.133	(5) _{TOTAL} -(5) _{FI}	0.126	1.18	1.00	0.149		
Property Damage Only (PDO)	-0.50	0.04	0.97	0.155	0.786	0.120	1.10	1.00	0.149		

(1)	(2)	(3)	(4)	(5)	(6)	
Collision Type	Proportion of Collision Type _(FI)	Predicted N brsv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N brsv (PDO) (crashes/year)	Predicted N _{brsv (TOTAL)} (crashes/year)	
,	from Table 12-6	(9) _{FI} from Worksheet 1E	from Table 12-6	(9)PDO from Worksheet 1E	(9)TOTAL from Worksheet 1E	
Total	1.000	0.040	1.000	0.149	0.189	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Collision with animal	0.001	0.000	0.001	0.000	0.000	
Collision with fixed object	0.612	0.025	0.809	0.120	0.145	
Collision with other object	0.020	0.001	0.029	0.004	0.005	
Other single-vehicle collision	0.367	0.015	0.161	0.024	0.039	

Work	sheet 1G Multiple-Vehicle Drive	way-Related Collisions by	y Driveway Type for Urban	and Suburban Roadway Segments	
(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	Number of driveways,	Crashes per driveway per year, N _j	Coefficient for traffic adjustment, t	Initial N _{brdwy}	Overdispersion parameter, k
	n _j	from Table 12-7	from Table 12-7	Equation 12-16	from Table 12-7
		IIOIII Table 12-7	HOIH TAble 12-7	n _j * N _j * (AADT/15,000) ^t	IIOIII Table 12-7
Major commercial	0	0.182	1.172	0.000	
Minor commercial	0	0.058	1.172	0.000	
Major industrial/institutional	0	0.198	1.172	0.000	
Minor industrial/institutional	0	0.026	1.172	0.000	
Major residential	0	0.096	1.172	0.000	
Minor residential	0	0.018	1.172	0.000	
Other	0	0.029	1.172	0.000	
Total				0.000	0.81

Worksheet 1H Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)	(7)			
Crash Severity Level	Initial N _{brdwy}		Adjusted N _{brdwy}	Combined CMFs	Calibration factor, C,	Predicted N _{brdwy}			
Crash Severity Level	(5) _{TOTAL} from Worksheet 1G	from Table 12-7	(2) _{TOTAL} * (3)	(6) from Worksheet 1B	, ,	(4)*(5)*(6)			
Total	0.000	1.000	0.000	1.18	1.00	0.000			
Fatal and injury (FI)		0.342	0.000	1.18	1.00	0.000			
Property damage only (PDO)		0.658	0.000	1.18	1.00	0.000			

	Worksheet 1I Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)	(8)*				
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{pedr}	Predicted N _{pedr}				
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8	(5)*(6)				
Гotal	1.216	0.189	0.000	1.405	0.009	0.013				
Fatal and injury (FI)						0.013				

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-19

	Worksheet 1J Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)	(8)*				
Crash Severity Level	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{biker}	Predicted N _{biker}				
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9	(5)*(6)				
Total	1.216	0.189	0.000	1.405	0.002	0.003				
Fatal and injury (FI)						0.003				

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-20

	et 1K Crash Severity Distribution for Urban		(4)
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 1D and 1F;	(5) from Worksheet 1D and 1F; and	(6) from Worksheet 1D and 1F;
Johnston type	(7) from Worksheet 1H; and	(7) from Worksheet 1H	(7) from Worksheet 1H; and
	(8) from Worksheet 1I and 1J		(8) from Worksheet 1I and 1J
	MULTIPLE-VEHICLE		
Rear-end collisions (from Worksheet 1D)	0.176	0.441	0.617
Head-on collisions (from Worksheet 1D)	0.027	0.003	0.030
Angle collisions (from Worksheet 1D)	0.062	0.113	0.176
Sideswipe, same direction (from Worksheet 1D)	0.032	0.217	0.249
Sideswipe, opposite direction (from Worksheet 1D)	0.028	0.027	0.055
Oriveway-related collisions (from Worksheet 1H)	0.000	0.000	0.000
Other multiple-vehicle collision (from Worksheet 1D)	0.019	0.070	0.089
Subtotal	0.345	0.871	1.216
	SINGLE-VEHICLE		
Collision with animal (from Worksheet 1F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 1F)	0.025	0.120	0.145
Collision with other object (from Worksheet 1F)	0.001	0.004	0.005
Other single-vehicle collision (from Worksheet 1F)	0.015	0.024	0.039
Collision with pedestrian (from Worksheet 1I)	0.013	0.000	0.013
Collision with bicycle (from Worksheet 1J)	0.003	0.000	0.003
Subtotal	0.056	0.149	0.205
「otal	0.401	1.020	1.421

V	Vorksheet 1L Summary Results for U	rban and Suburban Roadway Segmer	Worksheet 1L Summary Results for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)									
Crash Severity Level	Predicted average crash frequency, N predicted rs (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)									
	(Total) from Worksheet 1K		(2) / (3)									
Total	1.4	0.09	15.8									
Fatal and injury (FI)	0.4	0.09	4.5									
Property damage only (PDO)	1.0	0.09	11.3									

	Worksheet 2A General Information and Input	Data for Orban and Suburban Al	
	nformation		Location Information
Analyst	ST	Roadway	MD 189 (Falls Road)
Agency or Company	ATCS	Intersection	MD 189 at Wootton Pkwy
Date Performed	06/11/20	Jurisdiction	Montgomery County
		Analysis Year	2045
	ut Data	Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)	AADT - 07.700 (1/1)		4SG
AADT _{major} (veh/day)	$AADT_{MAX} = 67,700 (veh/day)$		23,996
AADT _{minor} (veh/day)	$AADT_{MAX} = 33,400 (veh/day)$		17,867
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C _i		1.00	1.00
Data for unsignalized intersections only:			
Number of major-road approaches with left-	turn lanes (0,1,2)	0	0
Number of major-road approaches with righ	t-turn lanes (0,1,2)	0	0
Data for signalized intersections only:			
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	4
Number of approaches with right-turn lanes	(0,1,2,3,4) [for 3SG, use maximum value of 3]	0	3
Number of approaches with left-turn signal	phasing [for 3SG, use maximum value of 3]		4
Type of left-turn signal phasing for Leg #1		Permissive	Protected
Type of left-turn signal phasing for Leg #2			Protected
Type of left-turn signal phasing for Leg #3			Permissive / Protected
Type of left-turn signal phasing for Leg #4 (i	f applicable)		Permissive / Protected
Number of approaches with right-turn-on-re	d prohibited [for 3SG, use maximum value of 3]	0	0
Intersection red light cameras (present/not p		Not Present	Not Present
Sum of all pedestrian crossing volumes (Pe	dVol) Signalized intersections only		120
Maximum number of lanes crossed by a per	destrian (n _{lanesx})		7
Number of bus stops within 300 m (1,000 ft)	of the intersection	0	10
Schools within 300 m (1,000 ft) of the inters	1 /	Not Present	Not Present
Number of alcohol sales establishments wit	nin 300 m (1,000 ft) of the intersection	0	0

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(6)	(7)				
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF				
	Phasing									
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}				
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)				
0.66	0.87	0.88	1.00	0.91	1.00	0.46				

		Worksheet	2C Multiple-	Vehicle Collisions by Seve	rity Level for Urban	and Suburban Arterial I	ntersections			
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
Crash Severity Level	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
_				Parameter, k	Initial N _{bimv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bimv}
	from Table 12-10		0	from Table 12-10 from Equation 12-		(4) _{TOTAL} *(5)	, *(5) (7) from		(6)*(7)*(8)	
	а	b	С	IIOIII Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)
Total	-10.99	1.07	0.23	0.39	7.795	1.000	7.795	0.46	1.00	3.590
Fotal and Injury (FI)	-13.14	40.44	4.40	0.00	0.407	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	2.583	0.46	4.00	1.189
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	2.497	0.331	2.303	0.46	1.00	1.109
Property Damage Only	44.00	4.00	0.04	0.44	F 000	(5) _{TOTAL} -(5) _{FI}	5.040	0.40	4.00	0.400
(PDO)	-11.02	1.02	0.24	0.44	5.039	0.669	5.212	0.46	1.00	2.400

	Worksheet 2D Multiple-	Vehicle Collisions by Collis	sion Type for Urban and Suburb	an Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N bimv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv (TOTAL)} (crashes/year)
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C
Total	1.000	1.189	1.000	2.400	3.590
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.450	0.535	0.483	1.159	1.695
Head-on collision	0.049	0.058	0.030	0.072	0.130
Angle collision	0.347	0.413	0.244	0.586	0.998
Sideswipe	0.099	0.118	0.032	0.077	0.195
Other multiple-vehicle collision	0.055	0.065	0.211	0.506	0.572

		Worksheet	2E Single-V	ehicle Collisions by Severi	ty Level for Urban	and Suburban Arterial In	tersections			
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
				Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}
Crash Severity Level	fr	om Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from		(C)*(7)*(0)
	2	b	С	from Table 12-12	(FI) from Eqn. 12-		(+)TOTAL (3)	Worksheet 2B		(6)*(7)*(8)
	а	b	C		24 or 12-27					
Total	-10.21	0.68	0.27	0.36	0.492	1.000	0.492	0.46	1.00	0.227
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.126	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.128	0.46	1.00	0.059
Fatal and injury (FI)	-9.25	0.43	0.29	0.09	0.120	0.260	0.120	0.40	1.00	0.059
Property Damage Only	44.04	0.70	0.05	0.44	0.350	(5) _{TOTAL} -(5) _{FI}	0.265	0.46	4.00	0.460
(PDO)	-11.34	0.78	0.25	0.44	0.359	0.740	0.365	0.46	1.00	0.168

	Worksheet 2F Single-V	ehicle Collisions by Collisi	on Type for Urban and Suburba	n Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bisv} (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv (TOTAL)} (crashes/year)
	from Table 12-13	(9)FI from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.059	1.000	0.168	0.227
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.000	0.000
Collision with fixed object	0.744	0.044	0.870	0.146	0.190
Collision with other object	0.072	0.004	0.070	0.012	0.016
Other single-vehicle collision	0.040	0.002	0.023	0.004	0.006
Single-vehicle noncollision	0.141	0.008	0.034	0.006	0.014

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(1) (2) (3) (4) (5)								
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}				
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total				-					
atal and injury (FI)				1					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections									
(1)	(1) (2) (3) (4)									
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF							
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CiviF							
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)							
4.15	1.00	1.00	4.15							

Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections											
(1)	(2)					(3)	(4)	(5)	(6)	(7)	
Crach Savarity Lavel	SPF Coefficients				Overdispersion	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}		
Crash Severity Level		f	rom Table 12-1	4		Parameter, k	from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)	
	а	b	С	d	е		IIOIII Equation 12-29	(4) Holli Worksheet 211		(4) (3) (0)	
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.054	4.15	1.00	0.225	
Fatal and Injury (FI)									1.00	0.225	

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(7)*				
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}				
Crash Seventy Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)				
Total	3.590	0.227	3.817	0.015	0.057				
Fatal and injury (FI)		-		1	0.057				

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksh	eet 2K Crash Severity Distribution for Urban a	na Suburban Arteriai Intersections	
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE		
Rear-end collisions (from Worksheet 2D)	0.535	1.159	1.695
Head-on collisions (from Worksheet 2D)	0.058	0.072	0.130
Angle collisions (from Worksheet 2D)	0.413	0.586	0.998
Sideswipe (from Worksheet 2D)	0.118	0.077	0.195
Other multiple-vehicle collision (from Worksheet 2D)	0.065	0.506	0.572
Subtotal	1.189	2.400	3.590
	SINGLE-VEHICLE		
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 2F)	0.044	0.146	0.190
Collision with other object (from Worksheet 2F)	0.004	0.012	0.016
Other single-vehicle collision (from Worksheet 2F)	0.002	0.004	0.006
Single-vehicle noncollision (from Worksheet 2F)	0.008	0.006	0.014
Collision with pedestrian (from Worksheet 2G or 2I)	0.225	0.000	0.225
Collision with bicycle (from Worksheet 2J)	0.057	0.000	0.057
Subtotal	0.341	0.168	0.509
Total	1.530	2.568	4.099

Worksheet 2L Summary Resul	ts for Urban and Suburban Arterial Intersections
(1)	(2)
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)
	(Total) from Worksheet 2K
Total	4.1
Fatal and injury (FI)	1.5
Property damage only (PDO)	2.6

	1A General Informa	ation and Input D	ata for Urban and Suburba		•	
General Information					Location Information	
Analyst	ST		Roadway		MD 189 (Falls Road)	
Agency or Company	ATC	S	Roadway Section		250 ft east of Wootton Pkwy to I-270 SPUI	
Date Performed	06/10/	/20	Jurisdiction		Montgomery County	
			Analysis Year		2045	
Input Data			Base Conditions		Site Conditions	
Roadway type (2U, 3T, 4U, 4D, ST)					4D	
Length of segment, L (mi)					0.24	
AADT (veh/day)	$AADT_{MAX} = 66,0$	000 (veh/day)			29,072	
Type of on-street parking (none/parallel/angle)			None	None		
Proportion of curb length with on-street parking					0	
Median width (ft) - for divided only			15		30	
Lighting (present / not present)			Not Present		Present	
Auto speed enforcement (present / not present)			Not Present		Not Present	
Major commercial driveways (number)					0	
Minor commercial driveways (number)					0	
Major industrial / institutional driveways (number)					0	
Minor industrial / institutional driveways (number)					0	
Major residential driveways (number)					1	
Minor residential driveways (number)					0	
Other driveways (number)					1	
Speed Category					Posted Speed Greater than 30 mph	
Roadside fixed object density (fixed objects / mi)		•	0		250	
Offset to roadside fixed objects (ft) [If greater than 30 or Not Pr	esent, input 30]	•	30		18	
Calibration Factor, Cr			1.00		1.00	

	Worksheet 1B Crash Modification Factors for Urban and Suburban Roadway Segments										
(1)	(2)	(3)	(4)	(5)	(6)						
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF						
CMF 1r	CMF 2r	CMF 3r	CMF 4r	CMF 5r	CMF comb						
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)						
1.00	1.51	0.98	0.91	1.00	1.35						

	Worksheet 1C Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments										
(1)	(1) (2)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
			Parameter, k	Initial N _{brmv}	Crashes	N _{brmv}	CMFs	Factor, Cr	N _{brmv}		
	from Ta	ble 12-3	from Table 12-3	rom Table 12-3 from Equation 12-10		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)		
	а	b	Hom rable 12-3	Hom Equation 12-10		(+)TOTAL (3)	Worksheet 1B		(0) (1) (0)		
Total	-12.34	1.36	1.32	1.234	1.000	1.234	1.35	1.00	1.667		
Fatal and Injury (FI)	-12.76	1.28	1.31	0.356	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.337	1.35	1.00	0.456		
ratai and injury (FI)	-12.70	1.20	1.51	0.330	0.273	0.337	1.55	1.00	0.450		
Promonty Domono Only (BDO)	40.04	4.20	1.24	0.047	(5) _{TOTAL} -(5) _{FI}	0.007	4.25	1.00	4 044		
Property Damage Only (PDO)	-12.81	1.38	1.34	0.947	0.727	0.897	1.35	1.00	1.211		

Wor	rksheet 1D Multiple-Vehicle No	ndriveway Collisions by	Collision Type for Urban ar	d Suburban Roadway Se	gments
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type(FI)	Predicted N brmv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N brmv (PDO) (crashes/year)	Predicted N _{brmv (TOTAL)} (crashes/year)
	from Table 12-4	(9) _{FI} from Worksheet 1C	from Table 12-4	(9)PDO from Worksheet 1C	(9)TOTAL from Worksheet 1C
Total	1.000	0.456	1.000	1.211	1.667
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.832	0.379	0.662	0.802	1.181
Head-on collision	0.020	0.009	0.007	0.008	0.018
Angle collision	0.040	0.018	0.036	0.044	0.062
Sideswipe, same direction	0.050	0.023	0.223	0.270	0.293
Sideswipe, opposite direction	0.010	0.005	0.001	0.001	0.006
Other multiple-vehicle collision	0.048	0.022	0.071	0.086	0.108

	Worksheet 1E Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments										
(1)	(2	2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)		
	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
Crash Severity Level			Parameter, k	Initial N _{brsv}	Crashes	N _{brsv}	CMFs	Factor, Cr	N_{brsv}		
Clasii Severity Lever	from Ta	ble 12-5	from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)		
	а	b	Holli Table 12-3	Holli Equation 12-13		(+)TOTAL (3)	Worksheet 1B		(0) (1) (0)		
Total	-5.05	0.47	0.86	0.193	1.000	0.193	1.35	1.00	0.260		
Fatal and Injury (FI)	-8.71	0.66	0.28	0.035	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.035	1.35	1.00	0.047		
ratarand injury (i i)	-0.71	0.00	0.20	0.000	0.181	0.033	1.55	1.00	0.047		
Dranarty Damage Only (DDO)	5.04	0.45	1.06	0.450	(5) _{TOTAL} -(5) _{FI}	0.450	4.05	1.00	0.040		
Property Damage Only (PDO)	-5.04	0.45	1.06	0.158	0.819	0.158	1.35	1.00	0.213		

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(F1)	Predicted N brsv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N brsv (PDO) (crashes/year)	Predicted N _{brsv (TOTAL)} (crashes/year)
,,	from Table 12-6	(9) _{FI} from Worksheet 1E	from Table 12-6	(9)PDO from Worksheet 1E	(9)TOTAL from Worksheet 1E
Total	1.000	0.047	1.000	0.213	0.260
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.001	0.000	0.063	0.013	0.013
Collision with fixed object	0.500	0.024	0.813	0.173	0.197
Collision with other object	0.028	0.001	0.016	0.003	0.005
Other single-vehicle collision	0.471	0.022	0.108	0.023	0.045

Worksheet 1	IG Multiple-Vehicle Drive	way-Related Collisions by	y Driveway Type for Urban	and Suburban Roadway Segments	
(1)	(2)	(3)	(4)	(5)	(6)
Drivewey Type	Number of driveways,	Crashes per driveway per year, N _j	Coefficient for traffic adjustment, t	Initial N _{brdwy}	Overdispersion parameter, k
Driveway Type Maior commercial	n _j	from Table 12-7	from Table 12-7	Equation 12-16 n _j * N _j * (AADT/15,000) ^t	from Table 12-7
Major commercial	0	0.033	1.106	0.000	
Minor commercial	0	0.011	1.106	0.000	
Major industrial/institutional	0	0.036	1.106	0.000	
Minor industrial/institutional	0	0.005	1.106	0.000	
Major residential	1	0.018	1.106	0.037	
Minor residential	0	0.003	1.106	0.000	
Other	1	0.005	1.106	0.010	
Total				0.048	1.39

Worksheet 1H Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(7)		
Crash Severity Level	Initial N _{brdwy}	Proportion of total crashes (f _{dwy})	Adjusted N _{brdwy}	Combined CMFs	Calibration factor, C,	Predicted N _{brdwy}		
Crash Severny Level	(5) _{TOTAL} from Worksheet 1G	from Table 12-7	(2) _{TOTAL} * (3)	(6) from Worksheet 1B	, ,	(4)*(5)*(6)		
Total	0.048	1.000	0.048	1.35	1.00	0.065		
Fatal and injury (FI)		0.284	0.014	1.35	1.00	0.018		
Property damage only (PDO)		0.716	0.034	1.35	1.00	0.046		

	Worksheet 1I Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments									
(1)	(2) (3) (4) (5) (6)									
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{pedr}	Predicted N _{pedr}				
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8	(5)*(6)				
Total	1.667	0.260	0.065	1.992	0.019	0.038				
Fatal and injury (FI)						0.038				

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-19

	Worksheet 1J Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments									
(1)	(2) (3) (4) (5) (6)									
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{biker}	Predicted N _{biker}				
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9	(5)*(6)				
Total	1.667	0.260	0.065	1.992	0.005	0.010				
Fatal and injury (FI)						0.010				

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-20

	et 1K Crash Severity Distribution for Urban		(4)
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 1D and 1F;	(5) from Worksheet 1D and 1F; and	(6) from Worksheet 1D and 1F;
comsion type	(7) from Worksheet 1H; and	(7) from Worksheet 1H	(7) from Worksheet 1H; and
	(8) from Worksheet 1I and 1J		(8) from Worksheet 1I and 1J
	MULTIPLE-VEHICLE		
Rear-end collisions (from Worksheet 1D)	0.379	0.802	1.181
Head-on collisions (from Worksheet 1D)	0.009	0.008	0.018
Angle collisions (from Worksheet 1D)	0.018	0.044	0.062
Sideswipe, same direction (from Worksheet 1D)	0.023	0.270	0.293
Sideswipe, opposite direction (from Worksheet 1D)	0.005	0.001	0.006
Oriveway-related collisions (from Worksheet 1H)	0.018	0.046	0.065
Other multiple-vehicle collision (from Worksheet 1D)	0.022	0.086	0.108
Subtotal	0.474	1.257	1.731
	SINGLE-VEHICLE	·	
Collision with animal (from Worksheet 1F)	0.000	0.013	0.013
Collision with fixed object (from Worksheet 1F)	0.024	0.173	0.197
Collision with other object (from Worksheet 1F)	0.001	0.003	0.005
Other single-vehicle collision (from Worksheet 1F)	0.022	0.023	0.045
Collision with pedestrian (from Worksheet 1I)	0.038	0.000	0.038
Collision with bicycle (from Worksheet 1J)	0.010	0.000	0.010
Subtotal	0.095	0.213	0.308
Total	0.569	1.471	2.039

V	Worksheet 1L Summary Results for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)						
Crash Severity Level	Predicted average crash frequency, N predicted rs (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)						
	(Total) from Worksheet 1K		(2) / (3)						
Total	2.0	0.24	8.5						
Fatal and injury (FI)	0.6	0.24	2.4						
Property damage only (PDO)	1.5	0.24	6.1						

		ation and input D	ata for Urban and Suburbar	, ,		
General Information			Location Information			
Analyst	S ⁻	Γ	Roadway	MD 189 (Falls Road)		
Agency or Company			Roadway Section	I-279 SPUI to 250 ft west of Great Falls Rd.		
Date Performed			Jurisdiction	Montgomery County		
			Analysis Year	2045		
Input Data			Base Conditions	Site Conditions		
Roadway type (2U, 3T, 4U, 4D, ST)				4D		
Length of segment, L (mi)				0.02		
AADT (veh/day)	$AADT_{MAX} = 66$,000 (veh/day)		21,254		
Type of on-street parking (none/parallel/angle)			None	None		
Proportion of curb length with on-street parking				0		
Median width (ft) - for divided only			15	15		
Lighting (present / not present)			Not Present	Present		
Auto speed enforcement (present / not present)			Not Present	Not Present		
Major commercial driveways (number)				0		
Minor commercial driveways (number)				0		
Major industrial / institutional driveways (number)				0		
Minor industrial / institutional driveways (number)				0		
Major residential driveways (number)				0		
Minor residential driveways (number)				0		
Other driveways (number)				0		
Speed Category				Posted Speed 30 mph or Lower		
Roadside fixed object density (fixed objects / mi)			0	100		
Offset to roadside fixed objects (ft) [If greater than 30 or Not Pr	esent, input 30]		30	11		
Calibration Factor, Cr			1.00	1.00		

	Worksheet 1B Crash Modification Factors for Urban and Suburban Roadway Segments								
(1)	(1) (2) (3) (4) (5)								
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF				
CMF 1r	CMF 2r	CMF 3r	CMF 4r	CMF 5r	CMF comb				
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)				
1.00	1.26	1.00	0.91	1.00	1.15				

(1)	worksnee	et 10 Multipl	e-Vehicle Nondriveway Co	ollisions by Severity Level	for Ordan and Suburba	(2)	egments	(0)	(0)
(1)	Level SPF Coefficients		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level			SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined
			Parameter, k	Initial N _{brmv}	Crashes	N_{brmv}	CMFs	Factor, Cr	N_{brmv}
	from Ta	ble 12-3	from Table 12-3	from Equation 12-10		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)
	а	b	Hom Table 12-3	Hom Equation 12-10		(T)IOIAL (O)	Worksheet 1B		
Total	-12.34	1.36	1.32	0.067	1.000	0.067	1.15	1.00	0.077
Fotol and Injury (FI)	-12.76	1.28	1.31	0.020	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.019	1.15	1.00	0.022
Fatal and Injury (FI)	-12.70	1.20	1.31	0.020	0.280	0.019		1.00	0.022
D	40.04	4.00	4.04	0.054	(5) _{TOTAL} -(5) _{FI}	0.040	4.45	4.00	0.050
Property Damage Only (PDO)	-12.81	1.38	1.34	0.051	0.720	0.048	1.15	1.00	0.056

Wor	ksheet 1D Multiple-Vehicle No	ndriveway Collisions by	Collision Type for Urban an	d Suburban Roadway Se	egments
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N brmv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N brmv (PDO) (crashes/year)	Predicted N _{brmv (TOTAL)} (crashes/year)
	from Table 12-4	(9)FI from Worksheet 1C	from Table 12-4	(9)PDO from Worksheet 1C	(9)TOTAL from Worksheet 1C
Total	1.000	0.022	1.000	0.056	0.077
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.832	0.018	0.662	0.037	0.055
Head-on collision	0.020	0.000	0.007	0.000	0.001
Angle collision	0.040	0.001	0.036	0.002	0.003
Sideswipe, same direction	0.050	0.001	0.223	0.012	0.013
Sideswipe, opposite direction	0.010	0.000	0.001	0.000	0.000
Other multiple-vehicle collision	0.048	0.001	0.071	0.004	0.005

	Worksheet 1E Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments									
(1)	(2	2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
Crash Severity Level			Parameter, k	Initial N _{brsv}	Crashes	N _{brsv}	CMFs	Factor, Cr	N _{brsv}	
Orasii deventy Level	from Ta	ble 12-5	from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)	
	а	b	HOIII TABIC 12-3	Hom Equation 12-13		(4)TOTAL (0)	Worksheet 1B		(0) (1) (0)	
Total	-5.05	0.47	0.86	0.014	1.000	0.014	1.15	1.00	0.016	
Fatal and Injury (FI)	-8.71	0.66	0.28	0.002	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.002	1.15	1.00	0.003	
ratarana mjury (r 1)	-0.7 1	0.00	0.20	0.002	0.171	0.002	1.10	1.00	0.003	
Property Damage Only (PDO)	-5.04	0.45	1.06	0.011	(5) _{TOTAL} -(5) _{FI}	0.011	1.15	1.00	0.013	
Froperty Damage Only (PDO)	-5.04	0.45	1.00	0.011	0.829	0.011	1.15	1.00	0.013	

(1)	(2)	(3)	(4)	(5)	(6)	
Collision Type	Proportion of Collision Type _(F1)	Predicted N brsv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N brsv (PDO) (crashes/year)	Predicted N $_{brsv\ (TOTAL)}$ (crashes/year)	
,	from Table 12-6	(9) _{FI} from Worksheet 1E	from Table 12-6	(9)PDO from Worksheet 1E	(9)TOTAL from Worksheet 1E	
Total	1.000	0.003	1.000	0.013	0.016	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Collision with animal	0.001	0.000	0.063	0.001	0.001	
Collision with fixed object	0.500	0.001	0.813	0.011	0.012	
Collision with other object	0.028	0.000	0.016	0.000	0.000	
Other single-vehicle collision	0.471	0.001	0.108	0.001	0.003	

Workshee	t 1G Multiple-Vehicle Drive	way-Related Collisions by	y Driveway Type for Urban	and Suburban Roadway Segments	
(1)	(2)	(3)	(4)	(5)	(6)
Driveyyey Type	Number of driveways,	Crashes per driveway Number of driveways, per year, N _i		Initial N _{brdwy}	Overdispersion parameter, k
Driveway Type	n _i	from Table 12-7	from Table 12-7	Equation 12-16	from Table 12-7
	·	ITOTTI TADIE 12-7	ITOTTI TABLE 12-7	n _j * N _j * (AADT/15,000) ^t	ITOTTI TABLE 12-7
Major commercial	0	0.033	1.106	0.000	
Minor commercial	0	0.011	1.106	0.000	
Major industrial/institutional	0	0.036	1.106	0.000	
Minor industrial/institutional	0	0.005	1.106	0.000	
Major residential	0	0.018	1.106	0.000	
Minor residential	0	0.003	1.106	0.000	
Other	0	0.005	1.106	0.000	
Total				0.000	1.39

Worksheet 1H Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments									
(1)	(2) (3) (4) (5)				(6)	(7)			
Crash Severity Level	Initial N _{brdwy}		Adjusted N _{brdwy}	Combined CMFs	Calibration factor, C,	Predicted N _{brdwy}			
Crash Seventy Level	(5) _{TOTAL} from Worksheet 1G	from Table 12-7	(2) _{TOTAL} * (3)	(6) from Worksheet 1B	, ,	(4)*(5)*(6)			
Total	0.000	1.000	0.000	1.15	1.00	0.000			
Fatal and injury (FI)		0.284	0.000	1.15	1.00	0.000			
Property damage only (PDO)		0.716	0.000	1.15	1.00	0.000			

	Worksheet 1I Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)	(8)*				
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{pedr}	Predicted N _{pedr}				
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8	(5)*(6)				
Total	0.077	0.016	0.000	0.093	0.067	0.006				
atal and injury (FI)						0.006				

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-19

	Worksheet 1J Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(8)*			
Crash Severity Level	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{biker}	Predicted N _{biker}			
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9	(5)*(6)			
Total	0.077	0.016	0.000	0.093	0.013	0.001			
Fatal and injury (FI)						0.001			

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-20

	et 1K Crash Severity Distribution for Urban a	and Suburban Roadway Segments	
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 1D and 1F;	(5) from Worksheet 1D and 1F; and	(6) from Worksheet 1D and 1F;
Soliision type	(7) from Worksheet 1H; and	(7) from Worksheet 1H	(7) from Worksheet 1H; and
	(8) from Worksheet 1I and 1J		(8) from Worksheet 1I and 1J
	MULTIPLE-VEHICLE	•	
Rear-end collisions (from Worksheet 1D)	0.018	0.037	0.055
Head-on collisions (from Worksheet 1D)	0.000	0.000	0.001
Angle collisions (from Worksheet 1D)	0.001	0.002	0.003
Sideswipe, same direction (from Worksheet 1D)	0.001	0.012	0.013
Sideswipe, opposite direction (from Worksheet 1D)	0.000	0.000	0.000
Driveway-related collisions (from Worksheet 1H)	0.000	0.000	0.000
Other multiple-vehicle collision (from Worksheet 1D)	0.001	0.004	0.005
Subtotal	0.022	0.056	0.077
	SINGLE-VEHICLE		
Collision with animal (from Worksheet 1F)	0.000	0.001	0.001
Collision with fixed object (from Worksheet 1F)	0.001	0.011	0.012
Collision with other object (from Worksheet 1F)	0.000	0.000	0.000
Other single-vehicle collision (from Worksheet 1F)	0.001	0.001	0.003
Collision with pedestrian (from Worksheet 1I)	0.006	0.000	0.006
Collision with bicycle (from Worksheet 1J)	0.001	0.000	0.001
Subtotal	0.010	0.013	0.023
Total	0.032	0.069	0.101

V	Worksheet 1L Summary Results for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)						
Crash Severity Level	, production to the production of the production		Crash rate (crashes/mi/year)						
	(Total) from Worksheet 1K		(2) / (3)						
Total	0.1	0.02	5.0						
Fatal and injury (FI)	0.0	0.02	1.6						
Property damage only (PDO)	0.1	0.02	3.4						

	Worksheet 2A General Information and Input	Data for Orban and Suburban A				
	Information		Location Information			
Analyst	ST	Roadway	MD 189 (Falls Road)			
Agency or Company	ATCS	Intersection	MD 189 at Great Falls Road			
Date Performed	06/11/20	Jurisdiction	Montgomery County			
		Analysis Year	2045			
I I	ut Data	Base Conditions	Site Conditions			
Intersection type (3ST, 3SG, 4ST, 4SG)	AADT		4SG			
AADT _{major} (veh/day)	$AADT_{MAX} = 67,700 (veh/day)$		19,543			
AADT minor (veh/day)	$AADT_{MAX} = 33,400 (veh/day)$	-	5,748			
Intersection lighting (present/not present)		Not Present	Present			
Calibration factor, C _i		1.00	1.00			
Data for unsignalized intersections only:						
Number of major-road approaches with left	-turn lanes (0,1,2)	0	0			
Number of major-road approaches with righ	nt-turn lanes (0,1,2)	0	0			
Data for signalized intersections only:						
Number of approaches with left-turn lanes	(0,1,2,3,4) [for 3SG, use maximum value of 3]	0	3			
Number of approaches with right-turn lanes	s (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	1			
Number of approaches with left-turn signal	phasing [for 3SG, use maximum value of 3]		1			
Type of left-turn signal phasing for Leg #1		Permissive	Permissive / Protected			
Type of left-turn signal phasing for Leg #2			Permissive			
Type of left-turn signal phasing for Leg #3			Permissive			
Type of left-turn signal phasing for Leg #4 (if applicable)		Permissive			
	ed prohibited [for 3SG, use maximum value of 3]	0	0			
Intersection red light cameras (present/not	present)	Not Present	Not Present			
Sum of all pedestrian crossing volumes (P	edVol) Signalized intersections only		491			
Maximum number of lanes crossed by a pe	edestrian (n _{lanesx})		6			
Number of bus stops within 300 m (1,000 ft	,	0	4			
Schools within 300 m (1,000 ft) of the inters	\1 /	Not Present	Not Present			
Number of alcohol sales establishments with	thin 300 m (1,000 ft) of the intersection	0	0			

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(6)	(7)				
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF				
	Phasing									
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}				
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)				
0.73	0.99	0.96	1.00	0.91	1.00	0.63				

		Worksheet	2C Multiple-	Vehicle Collisions by Seve	rity Level for Urban	and Suburban Arterial I	ntersections			
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
Crash Severity Level	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
from Table 12-10			Parameter, k	Initial N _{bimv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bimv}	
		0	from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from	Ī	(6)*(7)*(8)	
	а	b	С	IIOIII Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)
Total	-10.99	1.07	0.23	0.39	4.821	1.000	4.821	0.63	1.00	3.046
Fotal and Injury (FI)	-13.14	1.18	0.22	0.33	1.527	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	1.587	0.63	4.00	4.000
Fatal and Injury (FI)	-13.14	1.10	0.22	0.33	1.521	0.329	1.567	0.03	1.00	1.002
Property Damage Only	44.00	4.00	0.04	2.44	0.440	(5) _{TOTAL} -(5) _{FI}		2.22		
(PDO)	-11.02	1.02	0.24	0.44	3.113	0.671	3.235	0.63	1.00	2.044

	Worksheet 2D Multiple-	Vehicle Collisions by Collis	sion Type for Urban and Suburb	an Arterial Intersections		
(1)	(2)	(3)	(4)	(5)	(6)	
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bimv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv (TOTAL)} (crashes/year)	
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C	
Total	1.000	1.002	1.000	2.044	3.046	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Rear-end collision	0.450	0.451	0.483	0.987	1.438	
Head-on collision	0.049	0.049	0.030	0.061	0.110	
Angle collision	0.347	0.348	0.244	0.499	0.847	
Sideswipe	0.099	0.099	0.032	0.065	0.165	
Other multiple-vehicle collision	0.055	0.055	0.211	0.431	0.486	

		Worksheet	2E Single-V	ehicle Collisions by Severi	ty Level for Urban	and Suburban Arterial In	tersections			
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
				Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}
Crash Severity Level	rel from Table 12-12			from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)	
	2	٦		from Table 12-12	(FI) from Eqn. 12-		(+)TOTAL (3)	Worksheet 2B		(0) (1) (0)
	а	b c	24 or 12-27							
Total	-10.21	0.68	0.27	0.36	0.315	1.000	0.315	0.63	1.00	0.199
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.083	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.083	0.63	1.00	0.053
ratai and injury (FI)	-9.25	0.43	0.29	0.09	0.063	0.265	0.063	0.63	1.00	0.055
Property Damage Only	-11.34	0.78	0.25	0.44	0.000	(5) _{TOTAL} -(5) _{FI}	0.232	0.63	4.00	0.147
(PDO)	-11.34	0.78	0.25	0.44	0.230	0.735	0.232	0.03	1.00	0.147

	Worksheet 2F Single-V	ehicle Collisions by Collis	ion Type for Urban and Suburba	n Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bisv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv (TOTAL)} (crashes/year)
	from Table 12-13	(9)FI from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.053	1.000	0.147	0.199
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.000	0.000
Collision with fixed object	0.744	0.039	0.870	0.127	0.167
Collision with other object	0.072	0.004	0.070	0.010	0.014
Other single-vehicle collision	0.040	0.002	0.023	0.003	0.005
Single-vehicle noncollision	0.141	0.007	0.034	0.005	0.012

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(2)	(3)	(4)	(5)	(7)*				
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}				
Clash Severity Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total									
Fatal and injury (FI)				-					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections								
(1)	(1) (2) (3) (4)								
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF						
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CiviF						
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)						
4.15	1.00	1.00	4.15						

		Workshe	et 2I Vehicle	-Pedestrian C	collisions for l	Jrban and Suburba	n Arterial Signalized Inte	rsections		
(1)	(2)					(3)	(4)	(5)	(6)	(7)
SPF Coefficients Crash Severity Level				Overdispersion	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}		
Crash Severity Level		from Table 12-14					from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)
	а	b	С	d	е		IIOIII Equation 12-29	(4) HOIH WORKSHEEL ZIT		(4) (3) (0)
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.063	4.15	1.00	0.261
Fatal and Injury (FI)									1.00	0.261

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(7)*				
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}				
Crash Seventy Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)				
Total	3.046	0.199	3.245	0.015	0.049				
Fatal and injury (FI)				-	0.049				

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

(1)	(2)	(3)	(4)
· · · · · · · · · · · · · · · · · · ·	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE		• •
Rear-end collisions (from Worksheet 2D)	0.451	0.987	1.438
Head-on collisions (from Worksheet 2D)	0.049	0.061	0.110
Angle collisions (from Worksheet 2D)	0.348	0.499	0.847
Sideswipe (from Worksheet 2D)	0.099	0.065	0.165
Other multiple-vehicle collision (from Worksheet 2D)	0.055	0.431	0.486
Subtotal	1.002	2.044	3.046
	SINGLE-VEHICLE		
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 2F)	0.039	0.127	0.167
Collision with other object (from Worksheet 2F)	0.004	0.010	0.014
Other single-vehicle collision (from Worksheet 2F)	0.002	0.003	0.005
Single-vehicle noncollision (from Worksheet 2F)	0.007	0.005	0.012
Collision with pedestrian (from Worksheet 2G or 2I)	0.261	0.000	0.261
Collision with bicycle (from Worksheet 2J)	0.049	0.000	0.049
Subtotal	0.363	0.147	0.509
Fotal State of the state of the	1.365	2.190	3.556

Worksheet 2L Summary Resul	ts for Urban and Suburban Arterial Intersections
(1)	(2)
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)
	(Total) from Worksheet 2K
Total	3.6
Fatal and injury (FI)	1.4
Property damage only (PDO)	2.2

	Worksheet 2A General Information and Input	Data for Orban and Suburban Ar	
	Information		Location Information
Analyst	PK	Roadway	MD 190 River Road
Agency or Company	ATCS	Intersection	At Seven Locks Road
Date Performed	10/09/20	Jurisdiction	Montgomery County
		Analysis Year	2045
<u> </u>	ut Data	Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)	AADT		4SG
AADT _{major} (veh/day)	$AADT_{MAX} = 67,700 (veh/day)$		25,262
AADT _{minor} (veh/day)	$AADT_{MAX} = 33,400 (veh/day)$	-	12,947
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C _i		1.00	1.00
Data for unsignalized intersections only:			
Number of major-road approaches with left	-turn lanes (0,1,2)	0	0
Number of major-road approaches with rigit	nt-turn lanes (0,1,2)	0	0
Data for signalized intersections only:			-
Number of approaches with left-turn lanes	(0,1,2,3,4) [for 3SG, use maximum value of 3]	0	4
Number of approaches with right-turn lanes	s (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	2
Number of approaches with left-turn signal	phasing [for 3SG, use maximum value of 3]		3
Type of left-turn signal phasing for Leg #1		Permissive	Permissive
Type of left-turn signal phasing for Leg #2			Permissive / Protected
Type of left-turn signal phasing for Leg #3			Protected
Type of left-turn signal phasing for Leg #4	(if applicable)		Protected
Number of approaches with right-turn-on-re	ed prohibited [for 3SG, use maximum value of 3]	0	0
Intersection red light cameras (present/not		Not Present	Not Present
Sum of all pedestrian crossing volumes (P	edVol) Signalized intersections only		44
Maximum number of lanes crossed by a pe	edestrian (n _{lanesx})		6
Number of bus stops within 300 m (1,000 f	t) of the intersection	0	4
Schools within 300 m (1,000 ft) of the inters	\1 /	Not Present	Not Present
Number of alcohol sales establishments wi	thin 300 m (1,000 ft) of the intersection	0	0

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections										
(1)	(2)	(3)	(4)	(5)	(6)	(7)					
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF					
	Phasing										
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}					
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)					
0.66	0.87	0.92	1.00	0.91	1.00	0.48					

		Worksheet	2C Multiple-	Vehicle Collisions by Sever	rity Level for Urban	and Suburban Arterial I	ntersections				
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Crash Severity Level	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
-			Parameter, k	Initial N _{bimv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bimv}		
	fr	om Table 12-1	0	from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from	1	(6)*(7)*(8)	
	а	b	С	Holli Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)	
Total	-10.99	1.07	0.23	0.39	7.648	1.000	7.648	0.48	1.00	3.706	
Fotal and Injury (FI)	-13.14	1.18	0.22	0.33	2.471	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	2.559	0.48	1.00	1.240	
Fatal and Injury (FI)	-13.14	1.10	0.22	0.33	0.33	2.47 1	0.335	2.559	0.40	1.00	1.240
Property Damage Only	44.00	4.00	0.04	0.44	4.045	(5) _{TOTAL} -(5) _{FI}	5.000	0.40	4.00	0.400	
(PDO)	-11.02	1.02	0.24	0.44	4.915	0.665	5.089	0.48	1.00	2.466	

	Worksheet 2D Multiple-	Vehicle Collisions by Collis	sion Type for Urban and Suburb	an Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N bimv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv (TOTAL)} (crashes/year)
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C
Total	1.000	1.240	1.000	2.466	3.706
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.450	0.558	0.483	1.191	1.749
Head-on collision	0.049	0.061	0.030	0.074	0.135
Angle collision	0.347	0.430	0.244	0.602	1.032
Sideswipe	0.099	0.123	0.032	0.079	0.202
Other multiple-vehicle collision	0.055	0.068	0.211	0.520	0.589

		Worksheet	2E Single-V	ehicle Collisions by Severi	ty Level for Urban a	and Suburban Arterial In	tersections			
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
		Parameter		Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}
Crash Severity Level	fr	from Table 12-12			from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)
	а	a b	С		(FI) from Eqn. 12-		(T)TOTAL (S)	Worksheet 2B		(0) (1) (0)
	а	b	C		24 or 12-27					
Total	-10.21	0.68	0.27	0.36	0.468	1.000	0.468	0.48	1.00	0.227
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.117	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.119	0.48	1.00	0.057
ratai and injury (Fi)	-9.25	0.43	0.29	0.09	0.117	0.254	0.119	0.40	1.00	0.037
Property Damage Only	-11.34	0.78	0.25	0.44	0.344	(5) _{TOTAL} -(5) _{FI}	0.349	0.48	4.00	0.169
(PDO)	-11.34	0.78	0.25	0.44	0.344	0.746	0.349	0.48	1.00	0.169

	Worksheet 2F Single-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(6)					
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bisv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv (TOTAL)} (crashes/year)					
	from Table 12-13	(9)FI from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E					
Total	1.000	0.057	1.000	0.169	0.227					
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)					
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000					
Collision with animal	0.002	0.000	0.002	0.000	0.000					
Collision with fixed object	0.744	0.043	0.870	0.147	0.190					
Collision with other object	0.072	0.004	0.070	0.012	0.016					
Other single-vehicle collision	0.040	0.002	0.023	0.004	0.006					
Single-vehicle noncollision	0.141	0.008	0.034	0.006	0.014					

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections										
(1)	(1) (2) (3) (4)									
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}					
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)					
Total										
Fatal and injury (FI)				-						

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections									
(1)	(1) (2) (3)									
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Cambinad CMF							
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CMF							
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)							
4.15	1.00	1.00	4.15							

	Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections														
(1)	(2)					(3)	(4)	(5)	(6)	(7)					
Crash Severity Level	SPF Coefficients			Overdispersion	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}							
Crash Seventy Level		from Table 12-14					from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)					
	а	b	С	d	е		Hom Equation 12-29	(4) HOIH WORKSHEEL ZIT		(4) (3) (0)					
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.029	4.15	1.00	0.120					
Fatal and Injury (FI)							1		1.00	0.120					

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections										
(1)	(2)	(3)	(4)	(5)	(7)*					
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}					
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)					
Total	3.706	0.227	3.932	0.015	0.059					
Fatal and injury (FI)		-		-	0.059					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksh	neet 2K Crash Severity Distribution for Urban a	nd Suburban Arterial Intersections	
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE	·	• • •
Rear-end collisions (from Worksheet 2D)	0.558	1.191	1.749
Head-on collisions (from Worksheet 2D)	0.061	0.074	0.135
Angle collisions (from Worksheet 2D)	0.430	0.602	1.032
Sideswipe (from Worksheet 2D)	0.123	0.079	0.202
Other multiple-vehicle collision (from Worksheet 2D)	0.068	0.520	0.589
Subtotal	1.240	2.466	3.706
	SINGLE-VEHICLE	•	
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 2F)	0.043	0.147	0.190
Collision with other object (from Worksheet 2F)	0.004	0.012	0.016
Other single-vehicle collision (from Worksheet 2F)	0.002	0.004	0.006
Single-vehicle noncollision (from Worksheet 2F)	0.008	0.006	0.014
Collision with pedestrian (from Worksheet 2G or 2I)	0.120	0.000	0.120
Collision with bicycle (from Worksheet 2J)	0.059	0.000	0.059
Subtotal	0.237	0.169	0.406
Total	1.477	2.635	4.112

Worksheet 2L Summary Resu	Its for Urban and Suburban Arterial Intersections
(1)	(2)
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)
	(Total) from Worksheet 2K
Total	4.1
Fatal and injury (FI)	1.5
Property damage only (PDO)	2.6

	1A General Information	Tana Inpat D	The state of the s	, ,
General Information				Location Information
Analyst	PK		Roadway	MD 190 River Road
Agency or Company	ATCS		Roadway Section	Seven Locks Road to I-495 SB Terminal
Date Performed	10/09/20		Jurisdiction	Montgomery County
			Analysis Year	2045
Input Data			Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)				4D
Length of segment, L (mi)				0.09
AADT (veh/day)	$AADT_{MAX} = 66,000$	(veh/day)		25,793
Type of on-street parking (none/parallel/angle)			None	None
Proportion of curb length with on-street parking				0
Median width (ft) - for divided only			15	15
Lighting (present / not present)			Not Present	Present
Auto speed enforcement (present / not present)			Not Present	Not Present
Major commercial driveways (number)				0
Minor commercial driveways (number)				0
Major industrial / institutional driveways (number)				0
Minor industrial / institutional driveways (number)				0
Major residential driveways (number)				0
Minor residential driveways (number)				1
Other driveways (number)	·			0
Speed Category				Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)			0	44
Offset to roadside fixed objects (ft) [If greater than 30 or Not Pr	esent, input 30]		30	8
Calibration Factor, Cr			1.00	1.00

	Worksheet 1B Crash Modification Factors for Urban and Suburban Roadway Segments										
(1)	(2)	(3)	(4)	(5)	(6)						
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF						
CMF 1r	CMF 2r	CMF 3r	CMF 4r	CMF 5r	CMF comb						
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)						
1.00	1.12	1.00	0.91	1.00	1.03						

	Worksheet 1C Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments										
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Crash Severity Level	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
			Parameter, k	Initial N _{brmv}	Crashes	N_{brmv}	CMFs	Factor, Cr	N _{brmv}		
	from Ta	ble 12-3	from Table 12-3	from Equation 12-10		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)		
	а	b	Holli Table 12-3	IIOIII Equation 12-10		(4)TOTAL (3)	Worksheet 1B		(0) (1) (8)		
Total	-12.34	1.36	1.32	0.393	1.000	0.393	1.03	1.00	0.404		
Fatal and Injury (FI)	-12.76	1.28	1.31	0.115	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.108	1.03	1.00	0.111		
ratai and injury (FI)	-12.70	1.20	1.31	0.115	0.276	0.100	1.03	1.00	0.111		
Promonty Domono Only (PDO)	40.04	4.20	4.04	0.204	(5) _{TOTAL} -(5) _{FI}	0.005	4.02	1.00	0.202		
Property Damage Only (PDO)	-12.81	1.38	1.34	0.301	0.724	0.285	1.03	1.00	0.292		

Wor	Worksheet 1D Multiple-Vehicle Nondriveway Collisions by Collision Type for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)					
Collision Type	Proportion of Collision Type _(FI)	Predicted N brmv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N brmv (PDO) (crashes/year)	Predicted N _{brmv (TOTAL)} (crashes/year)					
	from Table 12-4	(9) _{FI} from Worksheet 1C	from Table 12-4	(9)PDO from Worksheet 1C	(9)TOTAL from Worksheet 1C					
Total	1.000	0.111	1.000	0.292	0.404					
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)					
Rear-end collision	0.832	0.093	0.662	0.194	0.286					
Head-on collision	0.020	0.002	0.007	0.002	0.004					
Angle collision	0.040	0.004	0.036	0.011	0.015					
Sideswipe, same direction	0.050	0.006	0.223	0.065	0.071					
Sideswipe, opposite direction	0.010	0.001	0.001	0.000	0.001					
Other multiple-vehicle collision	0.048	0.005	0.071	0.021	0.026					

	Worksheet 1E Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments										
(1)	(2)		(2) (3) (4) (5)		(5)	(6)	(7)	(8)	(9)		
	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
Crash Severity Level			Parameter, k	Initial N _{brsv}	Crashes	N _{brsv}	CMFs	Factor, Cr	N _{brsv}		
Orasii deventy Level	from Ta	ble 12-5	from Table 12-5	from Table 12-5 from Equation 12-13		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)		
	а	b	Hom rable 12-5	Hom Equation 12-15		(T)TOTAL (O)	Worksheet 1B		(0) (1) (0)		
Total	-5.05	0.47	0.86	0.068	1.000	0.068	1.03	1.00	0.070		
Fatal and Injury (FI)	-8.71	0.66	0.28	0.012	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.012	1.03	1.00	0.012		
i atai and injury (i i)	-0.71	0.00	0.20	0.012	0.177	0.012	1.03	1.00	0.012		
Property Damage Only (PDO)	-5.04	0.45	1.06	0.056	(5) _{TOTAL} -(5) _{FI}	0.056	1.03	1.00	0.058		
Property Damage Only (PDO)	-5.04	0.45	1.00	0.056	0.823	0.056	1.03	1.00	0.056		

(1)	(2)	(3)	(4)	(5)	(6)	
Collision Type	Proportion of Collision Type _(FI)	Predicted N brsv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N brsv (PDO) (crashes/year)	Predicted N _{brsv (TOTAL)} (crashes/year)	
,	from Table 12-6	(9)FI from Worksheet 1E	from Table 12-6	(9)PDO from Worksheet 1E	(9)TOTAL from Worksheet 1E	
Total	1.000	0.012	1.000	0.058	0.070	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Collision with animal	0.001	0.000	0.063	0.004	0.004	
Collision with fixed object	0.500	0.006	0.813	0.047	0.053	
Collision with other object	0.028	0.000	0.016	0.001	0.001	
Other single-vehicle collision	0.471	0.006	0.108	0.006	0.012	

Worksheet	1G Multiple-Vehicle Drive	way-Related Collisions by	y Driveway Type for Urban	and Suburban Roadway Segments	
(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	Number of driveways,	Crashes per driveway per year, N _j	Coefficient for traffic adjustment, t	Initial N _{brdwy}	Overdispersion parameter, k
Driveway Type	n _j	from Table 12-7	from Table 12-7	Equation 12-16	from Table 12-7
		Hom rable 12-7	ITOTTI TABLE 12-7	n _i * N _i * (AADT/15,000) ^t	IIOIII Table 12-7
Major commercial	0	0.033	1.106	0.000	
Minor commercial	0	0.011	1.106	0.000	
Major industrial/institutional	0	0.036	1.106	0.000	
Minor industrial/institutional	0	0.005	1.106	0.000	
Major residential	0	0.018	1.106	0.000	
Minor residential	1	0.003	1.106	0.005	
Other	0	0.005	1.106	0.000	
Total				0.005	1.39

Worksheet 1H Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)	(7)			
Crash Severity Level	Initial N _{brdwy}	Proportion of total crashes (f _{dwy})	Adjusted N _{brdwy}	Combined CMFs	Calibration factor, C,	Predicted N _{brdwy}			
Crash Severity Level	(5) _{TOTAL} from Worksheet 1G	from Table 12-7	(2) _{TOTAL} * (3)	(6) from Worksheet 1B		(4)*(5)*(6)			
Total	0.005	1.000	0.005	1.03	1.00	0.006			
Fatal and injury (FI)		0.284	0.002	1.03	1.00	0.002			
Property damage only (PDO)		0.716	0.004	1.03	1.00	0.004			

	Worksheet 1I Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)	(8)*				
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{pedr}	Predicted N _{pedr}				
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8	(5)*(6)				
Total	0.404	0.070	0.006	0.479	0.019	0.009				
Fatal and injury (FI)						0.009				

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-19

	Worksheet 1J Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)	(8)*				
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{biker}	Predicted N _{biker}				
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9	(5)*(6)				
Total	0.404	0.070	0.006	0.479	0.005	0.002				
Fatal and injury (FI)						0.002				

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-20

(1)	(2)	(3)	(4)
(*)	Fatal and injury (FI)	Property damage only (PDO)	Total
N 111 - 1	(3) from Worksheet 1D and 1F;	(5) from Worksheet 1D and 1F; and	(6) from Worksheet 1D and 1F;
Collision type	(7) from Worksheet 1H; and	(7) from Worksheet 1H	(7) from Worksheet 1H; and
	(8) from Worksheet 1I and 1J		(8) from Worksheet 1I and 1J
	MULTIPLE-VEHICLE	•	
Rear-end collisions (from Worksheet 1D)	0.093	0.194	0.286
lead-on collisions (from Worksheet 1D)	0.002	0.002	0.004
Angle collisions (from Worksheet 1D)	0.004	0.011	0.015
Sideswipe, same direction (from Worksheet 1D)	0.006	0.065	0.071
Sideswipe, opposite direction (from Worksheet 1D)	0.001	0.000	0.001
Oriveway-related collisions (from Worksheet 1H)	0.002	0.004	0.006
Other multiple-vehicle collision (from Worksheet 1D)	0.005	0.021	0.026
Subtotal	0.113	0.296	0.409
	SINGLE-VEHICLE		•
Collision with animal (from Worksheet 1F)	0.000	0.004	0.004
Collision with fixed object (from Worksheet 1F)	0.006	0.047	0.053
Collision with other object (from Worksheet 1F)	0.000	0.001	0.001
Other single-vehicle collision (from Worksheet 1F)	0.006	0.006	0.012
Collision with pedestrian (from Worksheet 1I)	0.009	0.000	0.009
Collision with bicycle (from Worksheet 1J)	0.002	0.000	0.002
Subtotal	0.024	0.058	0.082
otal	0.137	0.354	0.491

Worksheet 1L Summary Results for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)					
Crash Severity Level	Predicted average crash frequency, N predicted rs (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)					
•	(Total) from Worksheet 1K		(2) / (3)					
Total	0.5	0.09	5.5					
Fatal and injury (FI)	0.1	0.09	1.5					
Property damage only (PDO)	0.4	0.09	3.9					

Worksheet	1A General Informatio	n and Input D	ata for Urban and Suburba	n Roadway Segm	ents
General Information				Locati	on Information
Analyst	PK		Roadway		MD 190 River Road
Agency or Company	npany ATCS				I-495 SB Terminal to I-495 NB Terminal
Date Performed	10/09/20		Jurisdiction		Montgomery County
			Analysis Year		2045
Input Data			Base Conditions		Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)					4D
Length of segment, L (mi)				0.08	
AADT (veh/day)	$AADT_{MAX} = 66,000$	(veh/day)			37,501
Type of on-street parking (none/parallel/angle)			None		None
Proportion of curb length with on-street parking					0
Median width (ft) - for divided only			15		10
Lighting (present / not present)			Not Present		Present
Auto speed enforcement (present / not present)			Not Present		Not Present
Major commercial driveways (number)					0
Minor commercial driveways (number)					0
Major industrial / institutional driveways (number)					0
Minor industrial / institutional driveways (number)					0
Major residential driveways (number)					0
Minor residential driveways (number)					0
Other driveways (number)					0
Speed Category					Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)	0		50		
Offset to roadside fixed objects (ft) [If greater than 30 or Not Pr	esent, input 30]		30		14
Calibration Factor, Cr			1.00		1.00

Worksheet 1B Crash Modification Factors for Urban and Suburban Roadway Segments								
(1)	(2)	(2) (3) (4)						
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF			
CMF 1r	CMF 2r	CMF 3r	CMF 4r	CMF 5r	CMF comb			
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)			
1.00	1.09	1.01	0.91	1.00	1.01			

	Workshee	Worksheet 1C Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments										
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)			
Crash Severity Level	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted			
			Parameter, k	Initial N _{brmv}	Crashes	N _{brmv}	CMFs	Factor, Cr	N _{brmv}			
	from Ta	ble 12-3	from Table 12-3	from Equation 12-10		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)			
	а	b	Hom rable 12-3	IIOIII Equation 12-10		(4)TOTAL (3)	Worksheet 1B					
Total	-12.34	1.36	1.32	0.582	1.000	0.582	1.01	1.00	0.586			
Fatal and Injury (FI)	-12.76	1.28	1.31	0.165	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.156	1.01	1.00	0.157			
ratai and injury (Fi)	-12.70	1.20	1.31	0.103	0.268	0.150	1.01	1.00	0.157			
Property Democra Only (PDO)	40.04	4.20	4.04	0.440	(5) _{TOTAL} -(5) _{FI}	0.406	1.01	1.00	0.400			
Property Damage Only (PDO)	-12.81	1.38	1.34	0.449	0.732	0.426	1.01	1.00	0.428			

Wor	rksheet 1D Multiple-Vehicle No	ndriveway Collisions by (Collision Type for Urban ar	id Suburban Roadway Se	egments
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type(FI)	Predicted N brmv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N brmv (PDO) (crashes/year)	Predicted N _{brmv (TOTAL)} (crashes/year)
	from Table 12-4	(9)FI from Worksheet 1C	from Table 12-4	(9)PDO from Worksheet 1C	(9)TOTAL from Worksheet 1C
Total	1.000	0.157	1.000	0.428	0.586
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.832	0.131	0.662	0.284	0.414
Head-on collision	0.020	0.003	0.007	0.003	0.006
Angle collision	0.040	0.006	0.036	0.015	0.022
Sideswipe, same direction	0.050	0.008	0.223	0.096	0.103
Sideswipe, opposite direction	0.010	0.002	0.001	0.000	0.002
Other multiple-vehicle collision	0.048	0.008	0.071	0.030	0.038

	Worksheet 1E Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments										
(1)	(2)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
	SPF Coefficients Overdispersion		Initial N	Proportion of Total	Adjusted	Combined	Calibration	Predicted			
Crash Severity Level			Parameter, k	Initial N _{brsv}	Crashes	N _{brsv}	CMFs	Factor, Cr	N _{brsv}		
	from Ta	ble 12-5	from Table 12-5	from Equation 12-13		$(4)_{TOTAL}^{*}(5)$	(6) from		(6)*(7)*(8)		
	а	b	Hom rable 12 0	nom Equation 12 10		(')IOIAL (O)	Worksheet 1B				
Total	-5.05	0.47	0.86	0.072	1.000	0.072	1.01	1.00	0.073		
Fatal and Injury (FI)	9 71	0.66	0.28	0.014	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.014	1.01	1.00	0.014		
i atai and injury (i i)	-8.71 0.66 0.28	0.20	0.014	0.189	0.014	1.01	1.00	0.014			
Dramarti Damara Only (DDO)	-5.04	0.45	1.06	0.050	(5) _{TOTAL} -(5) _{FI}	0.059	1.01	4.00	0.059		
Property Damage Only (PDO)	-5.04	0.45	1.06	0.059	0.811	0.059	1.01	1.00	0.059		

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N brsv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N brsv (PDO) (crashes/year)	Predicted N _{brsv (TOTAL)} (crashes/year)
,	from Table 12-6	(9) _{FI} from Worksheet 1E	from Table 12-6	(9)PDO from Worksheet 1E	(9)TOTAL from Worksheet 1E
Total	1.000	0.014	1.000	0.059	0.073
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.001	0.000	0.063	0.004	0.004
Collision with fixed object	0.500	0.007	0.813	0.048	0.055
Collision with other object	0.028	0.000	0.016	0.001	0.001
Other single-vehicle collision	0.471	0.006	0.108	0.006	0.013

Work	sheet 1G Multiple-Vehicle Drive	way-Related Collisions by	y Driveway Type for Urban	and Suburban Roadway Segments	
(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	Number of driveways,	Crashes per driveway per year, N _j	Coefficient for traffic adjustment, t	Initial N _{brdwy}	Overdispersion parameter, k
	n _j	from Table 12-7	from Table 12-7	Equation 12-16	from Table 12-7
	-	HOIH TABLE 12-7	HOIH Table 12-7	n _j * N _j * (AADT/15,000) ^t	IIOIII Table 12-7
Major commercial	0	0.033	1.106	0.000	
Minor commercial	0	0.011	1.106	0.000	
Major industrial/institutional	0	0.036	1.106	0.000	
Minor industrial/institutional	0	0.005	1.106	0.000	
Major residential	0	0.018	1.106	0.000	
Minor residential	0	0.003	1.106	0.000	
Other	0	0.005	1.106	0.000	
Total				0.000	1.39

Worksheet 1H Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)	(7)			
Crash Severity Level	Initial N _{brdwy}	Proportion of total crashes (f _{dwy})	Adjusted N _{brdwy}	Combined CMFs	Calibration factor, C,	Predicted N _{brdwy}			
Crash Severity Level	(5) _{TOTAL} from Worksheet 1G	from Table 12-7	(2) _{TOTAL} * (3)	(6) from Worksheet 1B	, ·	(4)*(5)*(6)			
Total	0.000	1.000	0.000	1.01	1.00	0.000			
Fatal and injury (FI)		0.284	0.000	1.01	1.00	0.000			
Property damage only (PDO)		0.716	0.000	1.01	1.00	0.000			

	Worksheet 1I Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments										
(1)	(2)	(3)	(4)	(5)	(6)	(8)*					
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{pedr}	Predicted N _{pedr}					
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8	(5)*(6)					
Гotal	0.586	0.073	0.000	0.659	0.019	0.013					
Fatal and injury (FI)						0.013					

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-19

	Worksheet 1J Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments										
(1)	(2)	(3)	(4)	(5)	(6)	(8)*					
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{biker}	Predicted N _{biker}					
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9	(5)*(6)					
Total	0.586	0.073	0.000	0.659	0.005	0.003					
Fatal and injury (FI)						0.003					

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-20

(1)	(2)	(3)	(4)
· · ·	Fatal and injury (FI)	Property damage only (PDO)	Total
Callinian tuna	(3) from Worksheet 1D and 1F;	(5) from Worksheet 1D and 1F; and	(6) from Worksheet 1D and 1F;
Collision type	(7) from Worksheet 1H; and	(7) from Worksheet 1H	(7) from Worksheet 1H; and
	(8) from Worksheet 1I and 1J		(8) from Worksheet 1I and 1J
	MULTIPLE-VEHICLE		
Rear-end collisions (from Worksheet 1D)	0.131	0.284	0.414
Head-on collisions (from Worksheet 1D)	0.003	0.003	0.006
Angle collisions (from Worksheet 1D)	0.006	0.015	0.022
Sideswipe, same direction (from Worksheet 1D)	0.008	0.096	0.103
Sideswipe, opposite direction (from Worksheet 1D)	0.002	0.000	0.002
Oriveway-related collisions (from Worksheet 1H)	0.000	0.000	0.000
Other multiple-vehicle collision (from Worksheet 1D)	0.008	0.030	0.038
Subtotal	0.157	0.428	0.586
	SINGLE-VEHICLE		•
Collision with animal (from Worksheet 1F)	0.000	0.004	0.004
Collision with fixed object (from Worksheet 1F)	0.007	0.048	0.055
Collision with other object (from Worksheet 1F)	0.000	0.001	0.001
Other single-vehicle collision (from Worksheet 1F)	0.006	0.006	0.013
Collision with pedestrian (from Worksheet 1I)	0.013	0.000	0.013
Collision with bicycle (from Worksheet 1J)	0.003	0.000	0.003
Subtotal	0.030	0.059	0.089
Total Total	0.187	0.488	0.674

Worksheet 1L Summary Results for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)						
Crash Severity Level	Predicted average crash frequency, N predicted rs (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)						
	(Total) from Worksheet 1K		(2) / (3)						
Total	0.7	0.08	8.4						
Fatal and injury (FI)	0.2	0.08	2.3						
Property damage only (PDO)	0.5	0.08	6.1						

Worksheet	1A General In	formation	and Input D	ata for Urban and Suburba	n Roadway	Segments			
General Information						Location Information			
Analyst		TL		Roadway		MD 190 River Road			
Agency or Company		ATCS		Roadway Section		I-495 NB Terminal to Burdette Rd			
Date Performed		02/22/21		Jurisdiction		Montgomery County			
				Analysis Year		2045			
Input Data				Base Conditions		Site Conditions			
Roadway type (2U, 3T, 4U, 4D, ST)						4D			
Length of segment, L (mi)						0.08			
AADT (veh/day)	$AADT_{MAX} =$	66,000	(veh/day)			50,875			
Type of on-street parking (none/parallel/angle)				None		None			
Proportion of curb length with on-street parking						0			
Median width (ft) - for divided only				15		20			
Lighting (present / not present)				Not Present		Present			
Auto speed enforcement (present / not present)				Not Present		Not Present			
Major commercial driveways (number)						0			
Minor commercial driveways (number)						0			
Major industrial / institutional driveways (number)						0			
Minor industrial / institutional driveways (number)						0			
Major residential driveways (number)						0			
Minor residential driveways (number)						0			
Other driveways (number)						0			
Speed Category						Posted Speed Greater than 30 mph			
Roadside fixed object density (fixed objects / mi)	•	•		0		25			
Offset to roadside fixed objects (ft) [If greater than 30 or Not Pr	esent, input 30]	•		30		5			
Calibration Factor, Cr		•		1.00		1.00			

	Worksheet 1B Crash Modification Factors for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)					
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF					
CMF 1r	CMF 2r	CMF 3r	CMF 4r	CMF 5r	CMF comb					
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)					
1.00	1.08	0.99	0.91	1.00	0.98					

	Workshee	et 1C Multipl	e-Vehicle Nondriveway Co	ollisions by Severity Level	for Urban and Suburba	n Roadway Se	egments		
(1)	(2	2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
		Paramete		Initial N _{brmv}	Crashes	N_{brmv}	CMFs	Factor, Cr	N _{brmv}
	from Ta	ble 12-3	from Table 12-3	from Equation 12-10		(4) _{TOTAL} *(5)	*(5) (6) from		(6)*(7)*(8)
	а	b	Hom rable 12-3	IIOIII Equation 12-10		(4)TOTAL (3)	Worksheet 1B		(0) (1) (0)
Total	-12.34	1.36	1.32	0.881	1.000	0.881	0.98	1.00	0.863
Fatal and Injury (FI)	-12.76	1.28	1.31	0.243	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.231	0.98	1.00	0.226
ratai and injury (FI)	-12.70	1.20	1.31	0.243	0.262	0.231	0.90	1.00	0.220
Property Demoge Only (PDO)	-12.81	1.38	1 24	0.694	(5) _{TOTAL} -(5) _{FI}	0.650	0.00	1.00	0.637
Property Damage Only (PDO)	-12.81	1.38	1.34	0.684	0.738	0.050	0.98	1.00	0.037

Worksh	eet 1D Multiple-Vehicle No	ndriveway Collisions by	Collision Type for Urban an	d Suburban Roadway Se	egments
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N brmv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N _{brmv} (PDO) (crashes/year)	Predicted N _{brmv (TOTAL)} (crashes/year)
	from Table 12-4	(9) _{FI} from Worksheet 1C	from Table 12-4	(9)PDO from Worksheet 1C	(9)TOTAL from Worksheet 1C
Total	1.000	0.226	1.000	0.637	0.863
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.832	0.188	0.662	0.421	0.610
Head-on collision	0.020	0.005	0.007	0.004	0.009
Angle collision	0.040	0.009	0.036	0.023	0.032
Sideswipe, same direction	0.050	0.011	0.223	0.142	0.153
Sideswipe, opposite direction	0.010	0.002	0.001	0.001	0.003
Other multiple-vehicle collision	0.048	0.011	0.071	0.045	0.056

	Worksheet 1E Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments										
(1)	(2	2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)		
	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
Crash Severity Level			Parameter, k	Initial N _{brsv}	Crashes	N_{brsv}	CMFs	Factor, Cr	N_{brsv}		
Clasii Severity Lever	from Ta	ble 12-5	from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)		
	a	b	HOIII TABIC 12-3	Hom Equation 12-15		(T)IOIAL (O)	Worksheet 1B		(0) (1) (0)		
Total	-5.05	0.47	0.86	0.084	1.000	0.084	0.98	1.00	0.082		
Fatal and Injury (FI)	-8.71	0.66	0.28	0.017	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.017	0.98	1.00	0.016		
r atar and injury (i i)	-0.71	0.00	0.20	0.017	0.199	0.017	0.90	1.00	0.010		
Preparty Damage Only (PDO)	-5.04	0.45	1.06	0.068	(5) _{TOTAL} -(5) _{FI}	0.067	0.98	1.00	0.066		
Property Damage Only (PDO)	-5.04	0.45	1.00	0.008	0.801	0.067	0.98	1.00	0.000		

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N brsv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N brsv (PDO) (crashes/year)	Predicted N _{brsv (TOTAL)} (crashes/year)
,	from Table 12-6	(9) _{FI} from Worksheet 1E	from Table 12-6	(9)PDO from Worksheet 1E	(9)TOTAL from Worksheet 1E
Total	1.000	0.016	1.000	0.066	0.082
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.001	0.000	0.063	0.004	0.004
Collision with fixed object	0.500	0.008	0.813	0.053	0.061
Collision with other object	0.028	0.000	0.016	0.001	0.002
Other single-vehicle collision	0.471	0.008	0.108	0.007	0.015

Worksheet 1	IG Multiple-Vehicle Drive	way-Related Collisions by	y Driveway Type for Urban	and Suburban Roadway Segments	
(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	Number of driveways,	Crashes per driveway per year, N _j	Coefficient for traffic adjustment, t	Initial N _{brdwy}	Overdispersion parameter, k
Driveway Type	n _j	from Table 12-7	from Table 12-7	Equation 12-16	from Table 12-7
	-	HOIH Table 12-7	HOIH Table 12-7	n _i * N _i * (AADT/15,000) ^t	
Major commercial	0	0.033	1.106	0.000	
Minor commercial	0	0.011	1.106	0.000	
Major industrial/institutional	0	0.036	1.106	0.000	
Minor industrial/institutional	0	0.005	1.106	0.000	
Major residential	0	0.018	1.106	0.000	
Minor residential	0	0.003	1.106	0.000	
Other	0	0.005	1.106	0.000	
Total				0.000	1.39

Worksheet 1H Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)	(7)			
Crash Severity Level	Initial N _{brdwy}	Proportion of total crashes (f _{dwy})	Adjusted N _{brdwy}	Combined CMFs	Calibration factor, C,	Predicted N _{brdwy}			
Crash Seventy Level	(5) _{TOTAL} from Worksheet 1G	from Table 12-7	(2) _{TOTAL} * (3)	(6) from Worksheet 1B	, ,	(4)*(5)*(6)			
Total	0.000	1.000	0.000	0.98	1.00	0.000			
Fatal and injury (FI)		0.284	0.000	0.98	1.00	0.000			
Property damage only (PDO)		0.716	0.000	0.98	1.00	0.000			

Worksheet 1I Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments										
(1)	(2)	(3)	(4)	(5)	(6)	(8)*				
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{pedr}	Predicted N _{pedr}				
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8	(5)*(6)				
Total	0.863	0.082	0.000	0.945	0.019	0.018				
atal and injury (FI)						0.018				

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-19

Worksheet 1J Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)	(8)*			
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{biker}	Predicted N _{biker}			
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9	(5)*(6)			
Total	0.863	0.082	0.000	0.945	0.005	0.005			
Fatal and injury (FI)						0.005			

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-20

(1)	(2)	(3)	(4)
(' /	Fatal and injury (FI)	Property damage only (PDO)	Total
N-101-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-	(3) from Worksheet 1D and 1F;	(5) from Worksheet 1D and 1F; and	(6) from Worksheet 1D and 1F;
Collision type	(7) from Worksheet 1H; and	(7) from Worksheet 1H	(7) from Worksheet 1H; and
	(8) from Worksheet 1I and 1J	, ,	(8) from Worksheet 1I and 1J
	MULTIPLE-VEHICLE		., ,
Rear-end collisions (from Worksheet 1D)	0.188	0.421	0.610
lead-on collisions (from Worksheet 1D)	0.005	0.004	0.009
ngle collisions (from Worksheet 1D)	0.009	0.023	0.032
sideswipe, same direction (from Worksheet 1D)	0.011	0.142	0.153
sideswipe, opposite direction (from Worksheet 1D)	0.002	0.001	0.003
Priveway-related collisions (from Worksheet 1H)	0.000	0.000	0.000
Other multiple-vehicle collision (from Worksheet 1D)	0.011	0.045	0.056
Subtotal	0.226	0.637	0.863
	SINGLE-VEHICLE		
Collision with animal (from Worksheet 1F)	0.000	0.004	0.004
Collision with fixed object (from Worksheet 1F)	0.008	0.053	0.061
Collision with other object (from Worksheet 1F)	0.000	0.001	0.002
Other single-vehicle collision (from Worksheet 1F)	0.008	0.007	0.015
Collision with pedestrian (from Worksheet 1I)	0.018	0.000	0.018
Collision with bicycle (from Worksheet 1J)	0.005	0.000	0.005
Subtotal	0.039	0.066	0.105
otal	0.265	0.702	0.968

Worksheet 1L Summary Results for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)						
Crash Severity Level	Predicted average crash frequency, N predicted rs (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)						
	(Total) from Worksheet 1K		(2) / (3)						
Total	1.0	0.08	12.1						
Fatal and injury (FI)	0.3	0.08	3.3						
Property damage only (PDO)	0.7	0.08	8.8						

Company	Worksheet 2A General Information and Input Information	Data for Orban and Suburban A	
			Location Information
Analyst	PK	Roadway	MD 190 River Road
Agency or Company	ATCS	Intersection	At Burdette Road
Date Performed	10/09/20	Jurisdiction	Montgomery County
		Analysis Year	2045
	ut Data	Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)	AART		4SG
AADT _{major} (veh/day)	$AADT_{MAX} = 67,700 (veh/day)$		50,511
AADT _{minor} (veh/day)	$AADT_{MAX} = 33,400 (veh/day)$	-	4,183
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C _i		1.00	1.00
Data for unsignalized intersections only:			
Number of major-road approaches with left	-turn lanes (0,1,2)	0	0
Number of major-road approaches with right	nt-turn lanes (0,1,2)	0	0
Data for signalized intersections only:			
Number of approaches with left-turn lanes	(0,1,2,3,4) [for 3SG, use maximum value of 3]	0	2
Number of approaches with right-turn lanes	s (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	2
Number of approaches with left-turn signal	phasing [for 3SG, use maximum value of 3]		2
Type of left-turn signal phasing for Leg #1		Permissive	Permissive / Protected
Type of left-turn signal phasing for Leg #2		-	Permissive / Protected
Type of left-turn signal phasing for Leg #3			Permissive
Type of left-turn signal phasing for Leg #4 ((if applicable)		Permissive
Number of approaches with right-turn-on-re	ed prohibited [for 3SG, use maximum value of 3]	0	0
Intersection red light cameras (present/not		Not Present	Not Present
Sum of all pedestrian crossing volumes (P	edVol) Signalized intersections only		140
Maximum number of lanes crossed by a pe	edestrian (n _{lanesx})		7
Number of bus stops within 300 m (1,000 ft	t) of the intersection	0	3
Schools within 300 m (1,000 ft) of the inters	1 /	Not Present	Not Present
Number of alcohol sales establishments wi	thin 300 m (1,000 ft) of the intersection	0	0

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(6)	(7)				
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF				
	Phasing									
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}				
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)				
0.81	0.98	0.92	1.00	0.91	1.00	0.67				

	Worksheet 2C Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections										
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
Crash Severity Level	SPF Coefficients		ts	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
_			Parameter, k	Initial N _{bimv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bimv}		
	fr	om Table 12-1	0	from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from	1	(6)*(7)*(8)	
	а	b	С	Holli Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)	
Total	-10.99	1.07	0.23	0.39	12.379	1.000	12.379	0.67	1.00	8.248	
Fotal and Injury (FI)	-13.14	1.18	0.22	0.33	4.366	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	1 517	0.67	1.00	3.010	
Fatal and Injury (FI)	rand injury (FI) -13.14 1.18 0.22		0.33	4.300	0.365	4.317 0.07 1.00			3.010		
Property Damage Only	44.00	4.00	0.04	0.44	7.500	(5) _{TOTAL} -(5) _{FI}	7.004	0.07	4.00	5.000	
(PDO)	-11.02	1.02	0.24	0.44	7.598	0.635	7.861	0.67	1.00	5.238	

	Worksheet 2D Multiple-	Vehicle Collisions by Collis	sion Type for Urban and Suburb	an Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N bimv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv (TOTAL)} (crashes/year)
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C
Total	1.000	3.010	1.000	5.238	8.248
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.450	1.354	0.483	2.530	3.884
Head-on collision	0.049	0.147	0.030	0.157	0.305
Angle collision	0.347	1.044	0.244	1.278	2.323
Sideswipe	0.099	0.298	0.032	0.168	0.466
Other multiple-vehicle collision	0.055	0.166	0.211	1.105	1.271

	Worksheet 2E Single-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections									
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
			Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}	
Crash Severity Level	fr	om Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)
	а	b	С	from Table 12-12	(FI) from Eqn. 12-		(T)TOTAL (O)	Worksheet 2B		(0) (1) (0)
	а	b	· ·		24 or 12-27					
Total	-10.21	0.68	0.27	0.36	0.552	1.000	0.552	0.67	1.00	0.368
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.114	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.112	0.67	1.00	0.075
ratai and injury (Fi)	-9.25	0.43	0.29	0.09	0.114	0.203	0.112	0.07	1.00	0.075
Property Damage Only	44.04	0.70	0.05	0.44	0.440	(5) _{TOTAL} -(5) _{FI}	0.440	0.07	4.00	0.000
(PDO)	-11.34	0.78	0.25	0.44	0.446	0.797	0.440	0.67	1.00	0.293

	Worksheet 2F Single-V	ehicle Collisions by Collis	ion Type for Urban and Suburba	n Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bisv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv (TOTAL)} (crashes/year)
	from Table 12-13	(9)FI from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.075	1.000	0.293	0.368
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.001	0.001
Collision with fixed object	0.744	0.056	0.870	0.255	0.311
Collision with other object	0.072	0.005	0.070	0.021	0.026
Other single-vehicle collision	0.040	0.003	0.023	0.007	0.010
Single-vehicle noncollision	0.141	0.011	0.034	0.010	0.020

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(2)	(3)	(4)	(5)	(7)*				
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}				
Clash Severity Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total									
Fatal and injury (FI)				-					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections								
(1)	(2)	(3)	(4)						
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF						
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CiviF						
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)						
4.15	1.00	1.00	4.15						

Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections											
(1)	(2)					(3)	(4)	(5)	(6)	(7)	
Crash Severity Level		S	PF Coefficien	ts		Overdispersion N _{pedbase} Combined CI		ion N _{pedbase} Combined CMF			
Crash Seventy Level		from Table 12-14					from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)	
	а	b	С	d	е		Hom Equation 12-29	(4) HOIH WORKSHEEL ZIT		(4) (3) (0)	
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.037	4.15	1.00	0.152	
Fatal and Injury (FI)							1		1.00	0.152	

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(7)*				
Creat Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}				
Crash Severity Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)				
Total	8.248	0.368	8.616	0.015	0.129				
Fatal and injury (FI)		-		-	0.129				

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksheet 2K Crash Severity Distribution for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)						
	Fatal and injury (FI)	Property damage only (PDO)	Total						
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;						
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J						
	MULTIPLE-VEHICLE	·							
Rear-end collisions (from Worksheet 2D)	1.354	2.530	3.884						
Head-on collisions (from Worksheet 2D)	0.147	0.157	0.305						
Angle collisions (from Worksheet 2D)	1.044	1.278	2.323						
Sideswipe (from Worksheet 2D)	0.298	0.168	0.466						
Other multiple-vehicle collision (from Worksheet 2D)	0.166	1.105	1.271						
Subtotal	3.010	5.238	8.248						
	SINGLE-VEHICLE		•						
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000						
Collision with animal (from Worksheet 2F)	0.000	0.001	0.001						
Collision with fixed object (from Worksheet 2F)	0.056	0.255	0.311						
Collision with other object (from Worksheet 2F)	0.005	0.021	0.026						
Other single-vehicle collision (from Worksheet 2F)	0.003	0.007	0.010						
Single-vehicle noncollision (from Worksheet 2F)	0.011	0.010	0.020						
Collision with pedestrian (from Worksheet 2G or 2I)	0.152	0.000	0.152						
Collision with bicycle (from Worksheet 2J)	0.129	0.000	0.129						
Subtotal	0.355	0.293	0.649						
Total	3.365	5.531	8.896						

Worksheet 2L Summary Results for Urban and Suburban Arterial Intersections							
(1)	(2)						
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)						
	(Total) from Worksheet 2K						
Total	8.9						
Fatal and injury (FI)	3.4						
Property damage only (PDO)	5.5						

	heet 2A General Information and Input	Data for Urban and Suburban Art			
General Informa	tion	Location Information			
Analyst	TL	Roadway	Montrose Rd		
Agency or Company	ATCS	Intersection	At Seven Locks Rd		
Date Performed	02/19/21	Jurisdiction	Montgomery County		
		Analysis Year	2045		
Input Data		Base Conditions	Site Conditions		
Intersection type (3ST, 3SG, 4ST, 4SG)	AADT		4SG		
AADT _{major} (veh/day)	$AADT_{MAX} = 67,700 (veh/day)$		23,207		
AADT _{minor} (veh/day)	$AADT_{MAX} = 33,400$ (veh/day)		11,199		
Intersection lighting (present/not present)		Not Present	Present		
Calibration factor, C _i		1.00	1.00		
Data for unsignalized intersections only:					
Number of major-road approaches with left-turn land	es (0,1,2)	0	0		
Number of major-road approaches with right-turn la	nes (0,1,2)	0	0		
Data for signalized intersections only:					
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	4		
Number of approaches with right-turn lanes (0,1,2,3	,4) [for 3SG, use maximum value of 3]	0	2		
Number of approaches with left-turn signal phasing	[for 3SG, use maximum value of 3]		3		
Type of left-turn signal phasing for Leg #1		Permissive	Protected		
Type of left-turn signal phasing for Leg #2			Protected		
Type of left-turn signal phasing for Leg #3			Protected		
Type of left-turn signal phasing for Leg #4 (if applica			Permissive		
Number of approaches with right-turn-on-red prohib	ited [for 3SG, use maximum value of 3]	0	0		
Intersection red light cameras (present/not present)		Not Present	Not Present		
Sum of all pedestrian crossing volumes (PedVol)			164		
Maximum number of lanes crossed by a pedestrian	,		7		
Number of bus stops within 300 m (1,000 ft) of the i		0	4		
Schools within 300 m (1,000 ft) of the intersection (p		Not Present	Not Present		
Number of alcohol sales establishments within 300	m (1,000 ft) of the intersection	0	0		

Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(6)	(7)			
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF			
	Phasing								
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}			
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)			
0.66	0.83	0.92	1.00	0.91	1.00	0.46			

	Worksheet 2C Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections										
(1)	(2)		(1) (2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
-					Initial N _{bimv}	Crashes	N _{bimv}	CMFs	Factor, C _i	N_{bimv}	
	from Tab		0	from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)	
	а	b	С	IIOIII Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)	
Total	-10.99	1.07	0.23	0.39	6.755	1.000	6.755	0.46	1.00	3.108	
Fotal and Injuny (FI)	-13.14	1.18	0.22	0.33	2.166	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	2.244	0.46	1.00	1.033	
Fatal and Injury (FI)	-13.14	1.10	0.22	0.33	2.100	0.332	2.244	0.46	1.00	1.055	
Property Damage Only	-11.02	1.02	0.24	0.44	4.353	(5) _{TOTAL} -(5) _{FI}	4 544	0.46	1.00	2.075	
(PDO)	-11.02	1.02	0.24	0.44	4.303	0.668	4.511	0.46	1.00	2.075	

Worksheet 2D Multiple-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(6)				
Collision Type	Proportion of Collision Type _(FI)	Predicted N bimv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv (TOTAL)} (crashes/year)				
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C				
Total	1.000	1.033	1.000	2.075	3.108				
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)				
Rear-end collision	0.450	0.465	0.483	1.002	1.467				
Head-on collision	0.049	0.051	0.030	0.062	0.113				
Angle collision	0.347	0.358	0.244	0.506	0.865				
Sideswipe	0.099	0.102	0.032	0.066	0.169				
Other multiple-vehicle collision	0.055	0.057	0.211	0.438	0.495				

	Worksheet 2E Single-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections										
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
	S	PF Coefficient	ts	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
			Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}		
Crash Severity Level	fr	om Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)	
	2	b	С	from Table 12-12	(FI) from Eqn. 12-		(+)TOTAL (3)	Worksheet 2B		(0) (1) (0)	
	а	b	C		24 or 12-27						
Total	-10.21	0.68	0.27	0.36	0.424	1.000	0.424	0.46	1.00	0.195	
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.108	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.110	0.46	1.00	0.050	
Fatal and injury (FI)	-9.25	0.43	0.29	0.09	0.106	0.258	0.110	0.40	1.00	0.030	
Property Damage Only	44.04	0.70	0.05	0.44	0.244	(5) _{TOTAL} -(5) _{FI}	0.245	0.46	4.00	0.445	
(PDO)	-11.34	0.78	0.25	0.44	0.311	0.742	0.315	0.46	1.00	0.145	

	Worksheet 2F Single-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections										
(1)	(2)	(3)	(4)	(5)	(6)						
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bisv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv (TOTAL)} (crashes/year)						
	from Table 12-13	(9)FI from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E						
Total	1.000	0.050	1.000	0.145	0.195						
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)						
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000						
Collision with animal	0.002	0.000	0.002	0.000	0.000						
Collision with fixed object	0.744	0.038	0.870	0.126	0.164						
Collision with other object	0.072	0.004	0.070	0.010	0.014						
Other single-vehicle collision	0.040	0.002	0.023	0.003	0.005						
Single-vehicle noncollision	0.141	0.007	0.034	0.005	0.012						

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(2)	(3)	(4)	(5)	(7)*				
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}				
Clash Severity Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total									
Fatal and injury (FI)				-					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections								
(1)	(2)	(3)	(4)						
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF						
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CiviF						
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)						
4.15	1.00	1.00	4.15						

		Workshe	et 2I Vehicle	-Pedestrian C	ollisions for l	Jrban and Suburba	n Arterial Signalized Inte	rsections		
(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	SPF Coefficients					Overdispersion	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}
Crash Seventy Level		fı	om Table 12-1	4		Parameter, k	from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)
	а	b	С	d	е		IIOIII Equation 12-23	(4) HOITI WORKSHEET ZIT		(4) (3) (0)
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.052	4.15	1.00	0.214
Fatal and Injury (FI)							1		1.00	0.214

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(7)*				
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}				
Crash Seventy Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)				
Total	3.108	0.195	3.303	0.015	0.050				
Fatal and injury (FI)				1	0.050				

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksr	neet 2K Crash Severity Distribution for Urban a	nd Suburban Arterial Intersections	
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE	·	
Rear-end collisions (from Worksheet 2D)	0.465	1.002	1.467
Head-on collisions (from Worksheet 2D)	0.051	0.062	0.113
Angle collisions (from Worksheet 2D)	0.358	0.506	0.865
Sideswipe (from Worksheet 2D)	0.102	0.066	0.169
Other multiple-vehicle collision (from Worksheet 2D)	0.057	0.438	0.495
Subtotal	1.033	2.075	3.108
	SINGLE-VEHICLE		
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 2F)	0.038	0.126	0.164
Collision with other object (from Worksheet 2F)	0.004	0.010	0.014
Other single-vehicle collision (from Worksheet 2F)	0.002	0.003	0.005
Single-vehicle noncollision (from Worksheet 2F)	0.007	0.005	0.012
Collision with pedestrian (from Worksheet 2G or 2I)	0.214	0.000	0.214
Collision with bicycle (from Worksheet 2J)	0.050	0.000	0.050
Subtotal	0.314	0.145	0.459
Total	1.346	2.220	3.566

Worksheet 2L Summary Results for Urban and Suburban Arterial Intersections							
(1)	(2)						
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)						
	(Total) from Worksheet 2K						
Total	3.6						
Fatal and injury (FI)	1.3						
Property damage only (PDO)	2.2						

Worksheet	1A General In	formation	and Input D	ata for Urban and Suburba	n Roadway	Segments		
General Information				Location Information				
Analyst		TL		Roadway	Montrose Rd			
Agency or Company		ATCS		Roadway Section		Seven Locks Rd to Potomac Ave		
Date Performed		02/19/21		Jurisdiction		Montgomery County		
				Analysis Year		2045		
Input Data			Base Conditions		Site Conditions			
Roadway type (2U, 3T, 4U, 4D, ST)						4D		
Length of segment, L (mi)						0.02		
AADT (veh/day)	$AADT_{MAX} =$	66,000	(veh/day)			11,086		
Type of on-street parking (none/parallel/angle)				None		None		
Proportion of curb length with on-street parking						0		
Median width (ft) - for divided only				15		10		
Lighting (present / not present)				Not Present		Not Present		
Auto speed enforcement (present / not present)				Not Present		Not Present		
Major commercial driveways (number)						0		
Minor commercial driveways (number)						0		
Major industrial / institutional driveways (number)						0		
Minor industrial / institutional driveways (number)						1		
Major residential driveways (number)						0		
Minor residential driveways (number)						0		
Other driveways (number)						0		
Speed Category						Posted Speed Greater than 30 mph		
Roadside fixed object density (fixed objects / mi)		•	•	0		42		
Offset to roadside fixed objects (ft) [If greater than 30 or Not Pr	esent, input 30]	•	•	30		15		
Calibration Factor, Cr		•	•	1.00		1.00		

	Worksheet 1B Crash Modification Factors for Urban and Suburban Roadway Segments										
(1)	(2)	(3)	(4)	(5)	(6)						
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF						
CMF 1r	CMF 2r	CMF 3r	CMF 4r	CMF 5r	CMF comb						
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)						
1.00	1.07	1.01	1.00	1.00	1.08						

	Worksheet 1C Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments										
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Crash Severity Level	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
			Parameter, k	Initial N _{brmv}	Crashes	N_{brmv}	CMFs	Factor, Cr	N _{brmv}		
	from Ta	ble 12-3	from Table 12-3	from Table 12-3 from Equation 12-10		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)		
	а	b	Holli Table 12-3	IIOIII Equation 12-10		(4)TOTAL (3)	Worksheet 1B	(0) (1) (0)			
Total	-12.34	1.36	1.32	0.028	1.000	0.028	1.08	1.00	0.030		
Fotal and Injury (FI)	-12.76	1.28	1.31	0.009	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.008	1.08	1.00	0.009		
Fatal and Injury (FI)	-12.70	1.20	1.31	0.009	0.293	0.006	1.00	1.00	0.009		
Promonty Domono Only (PDO)	40.04	4.20	4.24	0.004	(5) _{TOTAL} -(5) _{FI}	0.000	4.00	1.00	0.004		
Property Damage Only (PDO)	-12.81	1.38	1.34	0.021	0.707	0.020	1.08	1.00	0.021		

Workshe	eet 1D Multiple-Vehicle No	ndriveway Collisions by	Collision Type for Urban an	id Suburban Roadway Se	egments
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type(FI)	Predicted N brmv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N brmv (PDO) (crashes/year)	Predicted N _{brmv (TOTAL)} (crashes/year)
	from Table 12-4	(9) _{FI} from Worksheet 1C	from Table 12-4	(9)PDO from Worksheet 1C	(9)TOTAL from Worksheet 1C
Total	1.000	0.009	1.000	0.021	0.030
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.832	0.007	0.662	0.014	0.021
Head-on collision	0.020	0.000	0.007	0.000	0.000
Angle collision	0.040	0.000	0.036	0.001	0.001
Sideswipe, same direction	0.050	0.000	0.223	0.005	0.005
Sideswipe, opposite direction	0.010	0.000	0.001	0.000	0.000
Other multiple-vehicle collision	0.048	0.000	0.071	0.001	0.002

	Worksheet 1E Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments										
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
Crash Severity Level			2 2.23		Parameter, k	Initial N _{brsv}	Crashes	N _{brsv}	CMFs	Factor, Cr	N_{brsv}
Clash Seventy Level	from Ta	ble 12-5	from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)		
	а	b	HOIII TABIC 12-3	Hom Equation 12-15		(T)TOTAL (O)	Worksheet 1B				
Total	-5.05	0.47	0.86	0.010	1.000	0.010	1.08	1.00	0.011		
Fatal and Injury (FI)	-8.71	0.66	0.28	0.002	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.002	1.08	1.00	0.002		
ratarand injury (i i)	-0.71	0.00	0.20	0.002	0.153	0.002	1.00	1.00	0.002		
Dranarti Damara Only (DDO)	5.04	0.45	1.06	0.000	(5) _{TOTAL} -(5) _{FI}	0.000	4.00	4.00	0.000		
Property Damage Only (PDO)	-5.04	0.45	1.06	0.009	0.847	0.009	1.08	1.00	0.009		

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N brsv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N brsv (PDO) (crashes/year)	Predicted N _{brsv (TOTAL)} (crashes/year)
,	from Table 12-6	(9) _{FI} from Worksheet 1E	from Table 12-6	(9)PDO from Worksheet 1E	(9)TOTAL from Worksheet 1E
Total	1.000	0.002	1.000	0.009	0.011
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.001	0.000	0.063	0.001	0.001
Collision with fixed object	0.500	0.001	0.813	0.008	0.008
Collision with other object	0.028	0.000	0.016	0.000	0.000
Other single-vehicle collision	0.471	0.001	0.108	0.001	0.002

Worksheet	Worksheet 1G Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)					
Drivewey Type	Number of driveways,	Crashes per driveway per year, N _j	Coefficient for traffic adjustment, t	Initial N _{brdwy}	Overdispersion parameter, k					
Driveway Type	n _i	from Table 12-7	from Table 12-7	Equation 12-16	from Table 12-7					
		HOIH TABLE 12-7	HOIH Table 12-7	n _i * N _i * (AADT/15,000) ^t	IIOIII Table 12-7					
Major commercial	0	0.033	1.106	0.000						
Minor commercial	0	0.011	1.106	0.000						
Major industrial/institutional	0	0.036	1.106	0.000						
Minor industrial/institutional	1	0.005	1.106	0.004						
Major residential	0	0.018	1.106	0.000						
Minor residential	0	0.003	1.106	0.000						
Other	0	0.005	1.106	0.000						
Total				0.004	1.39					

Worksheet 1H Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(7)		
Crash Severity Level	Initial N _{brdwy}	Proportion of total crashes (f _{dwy})	Adjusted N _{brdwy}	Combined CMFs	Calibration factor, C,	Predicted N _{brdwy}		
	(5) _{TOTAL} from Worksheet 1G	from Table 12-7	(2) _{TOTAL} * (3)	(6) from Worksheet 1B		(4)*(5)*(6)		
Total	0.004	1.000	0.004	1.08	1.00	0.004		
Fatal and injury (FI)		0.284	0.001	1.08	1.00	0.001		
Property damage only (PDO)		0.716	0.003	1.08	1.00	0.003		

Worksheet 1I Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments										
(1)	(2)	(3)	(4)	(5)	(6)	(8)*				
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{pedr}	Predicted N _{pedr}				
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8	(5)*(6)				
Гotal	0.030	0.011	0.004	0.045	0.019	0.001				
atal and injury (FI)						0.001				

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-19

Worksheet 1J Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)	(8)*			
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{biker}	Predicted N _{biker}			
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9	(5)*(6)			
Total	0.030	0.011	0.004	0.045	0.005	0.000			
Fatal and injury (FI)						0.000			

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-20

	et 1K Crash Severity Distribution for Urban		(4)
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 1D and 1F;	(5) from Worksheet 1D and 1F; and	(6) from Worksheet 1D and 1F;
complete type	(7) from Worksheet 1H; and	(7) from Worksheet 1H	(7) from Worksheet 1H; and
	(8) from Worksheet 1I and 1J		(8) from Worksheet 1I and 1J
	MULTIPLE-VEHICLE	•	
Rear-end collisions (from Worksheet 1D)	0.007	0.014	0.021
Head-on collisions (from Worksheet 1D)	0.000	0.000	0.000
Angle collisions (from Worksheet 1D)	0.000	0.001	0.001
Sideswipe, same direction (from Worksheet 1D)	0.000	0.005	0.005
Sideswipe, opposite direction (from Worksheet 1D)	0.000	0.000	0.000
Oriveway-related collisions (from Worksheet 1H)	0.001	0.003	0.004
Other multiple-vehicle collision (from Worksheet 1D)	0.000	0.001	0.002
Subtotal	0.010	0.024	0.034
	SINGLE-VEHICLE		
Collision with animal (from Worksheet 1F)	0.000	0.001	0.001
Collision with fixed object (from Worksheet 1F)	0.001	0.008	0.008
Collision with other object (from Worksheet 1F)	0.000	0.000	0.000
Other single-vehicle collision (from Worksheet 1F)	0.001	0.001	0.002
Collision with pedestrian (from Worksheet 1I)	0.001	0.000	0.001
Collision with bicycle (from Worksheet 1J)	0.000	0.000	0.000
Subtotal	0.003	0.009	0.012
Total	0.013	0.033	0.046

Worksheet 1L Summary Results for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)					
Crash Severity Level	Predicted average crash frequency, N predicted rs (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)					
	(Total) from Worksheet 1K		(2) / (3)					
Total	0.0	0.02	2.3					
Fatal and injury (FI)	0.0	0.02	0.6					
Property damage only (PDO)	0.0	0.02	1.7					

Works	heet 2A General Information and Input	Data for Urban and Suburban A	rterial Interse	ctions	
General Informa	tion		Locat	ion Information	
Analyst	TL	Roadway		Montrose Rd	
Agency or Company	ATCS	Intersection		At Potomac Ave	
Date Performed	02/19/21	Jurisdiction		Montgomery County	
		Analysis Year		2045	
Input Data		Base Conditions		Site Conditions	
Intersection type (3ST, 3SG, 4ST, 4SG)				4ST	
AADT _{major} (veh/day)	$AADT_{MAX} = 46,800 (veh/day)$	-		11,330	
AADT minor (veh/day)	$AADT_{MAX} = 5,900$ (veh/day)			3,526	
Intersection lighting (present/not present)		Not Present		Present	
Calibration factor, C _i		1.00		1.00	
Data for unsignalized intersections only:					
Number of major-road approaches with left-turn lane	es (0,1,2)	0		0	
Number of major-road approaches with right-turn la	nes (0,1,2)	0		0	
Data for signalized intersections only:					
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]	0			
Number of approaches with right-turn lanes (0,1,2,3	,4) [for 3SG, use maximum value of 3]	0			
Number of approaches with left-turn signal phasing	[for 3SG, use maximum value of 3]				
Type of left-turn signal phasing for Leg #1		Permissive			
Type of left-turn signal phasing for Leg #2					
Type of left-turn signal phasing for Leg #3					
Type of left-turn signal phasing for Leg #4 (if applica	ble)				
Number of approaches with right-turn-on-red prohib	ited [for 3SG, use maximum value of 3]	0			
Intersection red light cameras (present/not present)		Not Present			
Sum of all pedestrian crossing volumes (PedVol)	Signalized intersections only				
Maximum number of lanes crossed by a pedestrian	(n _{lanesx})				
Number of bus stops within 300 m (1,000 ft) of the in		0			
Schools within 300 m (1,000 ft) of the intersection (p		Not Present			
Number of alcohol sales establishments within 300	m (1,000 ft) of the intersection	0			

Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(6)	(7)			
CMF for Left-Turn Lanes	CMF for Left-Turn Signal Phasing	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF			
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}			
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)			
1.00	1.00	1.00	1.00	0.91	0.97	0.89			

	Worksheet 2C Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections										
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Crash Severity Level	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
-			Parameter, k	Initial N _{bimv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bimv}		
	fr	from Table 12-10		from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from	1	(6)*(7)*(8)	
	а	b	С	Holli Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)	
Total	-8.90	0.82	0.25	0.40	2.219	1.000	2.219	0.89	1.00	1.967	
Fotol and Injury (FI)	-11.13	0.93	0.28	0.49	(4) _{FI} /(($(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.844	0.89	1.00	0.748	
Fatal and Injury (FI)	-11.13	0.93	0.20	0.48	0.851	0.380	0.044	0.89	1.00	0.746	
Property Damage Only	0.74	0.77	0.00	0.40	4.000	(5) _{TOTAL} -(5) _{FI}	4.075	0.00	4.00	1.010	
(PDO)	-8.74	0.77	0.23	0.40	1.386	0.620	1.375	0.89	1.00	1.219	

Worksheet 2D Multiple-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections										
(1)	(2)	(3)	(4)	(5)	(6)					
Collision Type	Proportion of Collision Predicted N bimb (crashes/year		Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv (TOTAL)} (crashes/year)					
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C					
Total	1.000	0.748	1.000	1.219	1.967					
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)					
Rear-end collision	0.338	0.253	0.374	0.456	0.709					
Head-on collision	0.041	0.031	0.030	0.037	0.067					
Angle collision	0.440	0.329	0.335	0.408	0.737					
Sideswipe	0.121	0.091	0.044	0.054	0.144					
Other multiple-vehicle collision	0.060	0.045	0.217	0.264	0.309					

	Worksheet 2E Single-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections										
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
			Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}		
Crash Severity Level	fr	om Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(4) *(5) (7) from		(6)*(7)*(8)	
	а	b	С	from Table 12-12	(FI) from Eqn. 12-		(T)TOTAL (O)	Worksheet 2B		(0) (1) (0)	
	а	b	· ·		24 or 12-27						
Total	-5.33	0.33	0.12	0.65	0.281	1.000	0.281	0.89	1.00	0.249	
Fatal and Injury (FI)					0.079	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.081	0.89	1.00	0.072	
ratarand injury (FI)					0.079	0.288	0.061	0.09	1.00	0.072	
Property Damage Only	7.04	0.26	0.05	0.54	0.404	(5) _{TOTAL} -(5) _{FI}	0.200	0.00	4.00	0.477	
(PDO)	-7.04	0.36	0.25	0.54	0.194	0.712	0.200	0.89	1.00	0.177	

	Worksheet 2F Single-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections										
(1)	(2)	(3)	(4)	(5)	(6)						
Collision Type	Proportion of Collision Type(FI)	Predicted N _{bisv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv (TOTAL)} (crashes/year)						
	from Table 12-13	(9)FI from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E						
Total	1.000	0.072	1.000	0.177	0.249						
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)						
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000						
Collision with animal	0.001	0.000	0.026	0.005	0.005						
Collision with fixed object	0.679	0.049	0.847	0.150	0.199						
Collision with other object	0.089	0.006	0.070	0.012	0.019						
Other single-vehicle collision	0.051	0.004	0.007	0.001	0.005						
Single-vehicle noncollision	0.179	0.013	0.049	0.009	0.022						

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(2)	(3)	(4)	(5)	(7)*				
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}				
Grasii Geventy Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total	1.967	0.249	2.216	0.022	0.049				
Fatal and injury (FI)		-	-	-	0.049				

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections								
(1)	(2)	(3)	(4)						
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF						
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CiviF						
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)						
									

		Workshe	et 2I Vehicle	-Pedestrian C	Collisions for l	Jrban and Suburba	n Arterial Signalized Inte	rsections		
(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level		SPF Coefficients				Overdispersion	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}
Crash Severity Level		f	rom Table 12-1	4		Parameter, k	from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)
	а	b	С	d	е		IIOIII Equation 12-29	(4) Holli Worksheet 2H		(4) (3) (0)
Total									1.00	
Fatal and Injury (FI)		-							1.00	

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections										
(1)	(2)	(3)	(4)	(5)	(7)*					
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}					
Crash Severity Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)					
Total	1.967	0.249	2.216	0.018	0.040					
Fatal and injury (FI)				-	0.040					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksh	neet 2K Crash Severity Distribution for Urban a	nd Suburban Arterial Intersections	
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE	·	
Rear-end collisions (from Worksheet 2D)	0.253	0.456	0.709
Head-on collisions (from Worksheet 2D)	0.031	0.037	0.067
Angle collisions (from Worksheet 2D)	0.329	0.408	0.737
Sideswipe (from Worksheet 2D)	0.091	0.054	0.144
Other multiple-vehicle collision (from Worksheet 2D)	0.045	0.264	0.309
Subtotal	0.748	1.219	1.967
	SINGLE-VEHICLE		•
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.005	0.005
Collision with fixed object (from Worksheet 2F)	0.049	0.150	0.199
Collision with other object (from Worksheet 2F)	0.006	0.012	0.019
Other single-vehicle collision (from Worksheet 2F)	0.004	0.001	0.005
Single-vehicle noncollision (from Worksheet 2F)	0.013	0.009	0.022
Collision with pedestrian (from Worksheet 2G or 2I)	0.049	0.000	0.049
Collision with bicycle (from Worksheet 2J)	0.040	0.000	0.040
Subtotal	0.160	0.177	0.338
Total	0.909	1.396	2.305

Worksheet 2L Summary Resi	Worksheet 2L Summary Results for Urban and Suburban Arterial Intersections							
(1)	(2)							
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)							
	(Total) from Worksheet 2K							
Total	2.3							
Fatal and injury (FI)	0.9							
Property damage only (PDO)	1.4							

		ormation and	input D	ata for Urban and Suburba		<u> </u>	
General Information				Location Information			
Analyst		TL		Roadway		Montrose Rd	
Agency or Company	A	ATCS		Roadway Section		Potomac Ave to Tower Oaks Blvd	
Date Performed	02	2/19/21		Jurisdiction		Montgomery County	
				Analysis Year		2045	
Input Data			Base Conditions		Site Conditions		
Roadway type (2U, 3T, 4U, 4D, ST)						4D	
Length of segment, L (mi)						0.45	
AADT (veh/day)	AADT _{MAX} =	66,000 (\	/eh/day)			42,387	
Type of on-street parking (none/parallel/angle)				None		None	
Proportion of curb length with on-street parking						0	
Median width (ft) - for divided only				15		10	
Lighting (present / not present)				Not Present		Present	
Auto speed enforcement (present / not present)				Not Present		Not Present	
Major commercial driveways (number)						0	
Minor commercial driveways (number)						0	
Major industrial / institutional driveways (number)						0	
Minor industrial / institutional driveways (number)						0	
Major residential driveways (number)						0	
Minor residential driveways (number)						0	
Other driveways (number)						0	
Speed Category			•			Posted Speed Greater than 30 mph	
Roadside fixed object density (fixed objects / mi)		•	•	0		61	
Offset to roadside fixed objects (ft) [If greater than 30 or Not Pr	esent, input 30]		•	30		9	
Calibration Factor, Cr				1.00		1.00	

Worksheet 1B Crash Modification Factors for Urban and Suburban Roadway Segments										
(1)	(2)	(3)	(4)	(5)	(6)					
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF					
CMF 1r	CMF 2r	CMF 3r	CMF 4r	CMF 5r	CMF comb					
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)					
1.00	1.17	1.01	0.91	1.00	1.08					

	Worksheet 1C Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments										
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Crash Severity Level	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
			Parameter, k	Initial N _{brmv}	Crashes	N_{brmv}	CMFs	Factor, Cr	N _{brmv}		
	from Table 12-3		from Table 12-3	from Equation 12-10		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)		
	а	b	Holli Table 12-5	ITOTT Equation 12-10	(+)TOTAL (Worksheet 1B		(0) (1) (0)		
Total	-12.34	1.36	1.32	3.864	1.000	3.864	1.08	1.00	4.163		
Fotal and Injury (FI)	-12.76	1.28	1.31	1.083	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	1.028	1.08	1.00	1.107		
Fatal and Injury (FI)	-12.70	1.20	1.31	1.003	0.266	1.020	1.00	1.00	1.107		
D	40.04	4.00	4.04	0.000	(5) _{TOTAL} -(5) _{FI}	0.007	4.00	4.00	0.050		
Property Damage Only (PDO)	-12.81	1.38	1.34	2.989	0.734	2.837	1.08	1.00	3.056		

Wo	rksheet 1D Multiple-Vehicle No	ndriveway Collisions by	Collision Type for Urban an	id Suburban Roadway Se	egments
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	(crashes/year) Type (PDO)		Predicted N brmv (PDO) (crashes/year)	Predicted N _{brmv (TOTAL)} (crashes/year)
	from Table 12-4	(9)FI from Worksheet 1C	from Table 12-4	(9)PDO from Worksheet 1C	(9)TOTAL from Worksheet 1C
Total	1.000	1.107	1.000	3.056	4.163
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.832	0.921	0.662	2.023	2.944
Head-on collision	0.020	0.022	0.007	0.021	0.044
Angle collision	0.040	0.044	0.036	0.110	0.154
Sideswipe, same direction	0.050	0.055	0.223	0.681	0.737
Sideswipe, opposite direction	0.010	0.011	0.001	0.003	0.014
Other multiple-vehicle collision	0.048	0.053	0.071	0.217	0.270

	W	orksheet 1E -	- Single-Vehicle Collisions I	y Severity Level for Urba	an and Suburban Road	way Segments	3			
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
Crash Severity Level			Parameter, k	Initial N _{brsv}	Crashes	N _{brsv}	CMFs	Factor, Cr	N _{brsv}	
Clasii Severity Level	from Ta	ble 12-5	from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)	
	a	b	Hom rable 12-5	IIOIII Table 12-3		(4)TOTAL (0)	Worksheet 1B		(0) (1) (0)	
Total	-5.05	0.47	0.86	0.431	1.000	0.431	1.08	1.00	0.465	
Fatal and Injury (FI)	-8.71	0.66	0.28	0.084	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.083	1.08	1.00	0.090	
ratarana injury (i i)	-0.71	0.00	0.20	0.004	0.193	0.000	1.00	1.00	0.030	
Preparty Damage Only (PDO)	-5.04	0.45	1.06	0.352	(5) _{TOTAL} -(5) _{FI}	0.348	1.08	1.00	0.375	
Property Damage Only (PDO)	-5.04	0.45	1.06	0.352	0.807	0.346	1.00	1.00	0.375	

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{brsv} (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N brsv (PDO) (crashes/year)	Predicted N _{brsv (TOTAL)} (crashes/year)
	from Table 12-6	(9)FI from Worksheet 1E	from Table 12-6	(9)PDO from Worksheet 1E	(9)TOTAL from Worksheet 1E
Total	1.000	0.090	1.000	0.375	0.465
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.001	0.000	0.063	0.024	0.024
Collision with fixed object	0.500	0.045	0.813	0.305	0.350
Collision with other object	0.028	0.003	0.016	0.006	0.009
Other single-vehicle collision	0.471	0.042	0.108	0.041	0.083

Worksheet	1G Multiple-Vehicle Drive	way-Related Collisions by	y Driveway Type for Urban	and Suburban Roadway Segments	
(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	Number of driveways,	Crashes per driveway per year, N _j	Coefficient for traffic adjustment, t	Initial N _{brdwy}	Overdispersion parameter, k
	n _j	from Table 12-7	from Table 12-7	Equation 12-16	from Table 12-7
		HOIH TABLE 12-7	HOIH Table 12-7	n _i * N _i * (AADT/15,000) ^t	from Table 12-7
Major commercial	0	0.033	1.106	0.000	
Minor commercial	0	0.011	1.106	0.000	
Major industrial/institutional	0	0.036	1.106	0.000	
Minor industrial/institutional	0	0.005	1.106	0.000	
Major residential	0	0.018	1.106	0.000	
Minor residential	0	0.003	1.106	0.000	
Other	0	0.005	1.106	0.000	
Total				0.000	1.39

Worksheet 1H Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)	(7)			
Crash Severity Level	Initial N _{brdwy}	Proportion of total crashes (f _{dwy})	Adjusted N _{brdwy}	Combined CMFs	Calibration factor, C,	Predicted N _{brdwy}			
	(5) _{TOTAL} from Worksheet 1G	from Table 12-7	(2) _{TOTAL} * (3)	(6) from Worksheet 1B	, ,	(4)*(5)*(6)			
Total	0.000	1.000	0.000	1.08	1.00	0.000			
Fatal and injury (FI)		0.284	0.000	1.08	1.00	0.000			
Property damage only (PDO)		0.716	0.000	1.08	1.00	0.000			

Worksheet 1I Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments										
(1)	(2)	(3)	(4)	(5)	(6)	(8)*				
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{pedr}	Predicted N _{pedr}				
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8	(5)*(6)				
otal	4.163	0.465	0.000	4.628	0.019	0.088				
atal and injury (FI)						0.088				

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-19

	Worksheet 1J Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments										
(1)	(2)	(3)	(4)	(5)	(6)	(8)*					
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{biker}	Predicted N _{biker}					
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9	(5)*(6)					
Total	4.163	0.465	0.000	4.628	0.005	0.023					
Fatal and injury (FI)						0.023					

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-20

(1)	(2)	(3)	(4)
\ /	Fatal and injury (FI)	Property damage only (PDO)	Total
N=111-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-	(3) from Worksheet 1D and 1F;	(5) from Worksheet 1D and 1F; and	(6) from Worksheet 1D and 1F;
Collision type	(7) from Worksheet 1H; and	(7) from Worksheet 1H	(7) from Worksheet 1H; and
	(8) from Worksheet 1I and 1J		(8) from Worksheet 1I and 1J
	MULTIPLE-VEHICLE	•	
Rear-end collisions (from Worksheet 1D)	0.921	2.023	2.944
lead-on collisions (from Worksheet 1D)	0.022	0.021	0.044
Angle collisions (from Worksheet 1D)	0.044	0.110	0.154
Sideswipe, same direction (from Worksheet 1D)	0.055	0.681	0.737
Sideswipe, opposite direction (from Worksheet 1D)	0.011	0.003	0.014
Oriveway-related collisions (from Worksheet 1H)	0.000	0.000	0.000
Other multiple-vehicle collision (from Worksheet 1D)	0.053	0.217	0.270
Subtotal	1.107	3.056	4.163
	SINGLE-VEHICLE		•
Collision with animal (from Worksheet 1F)	0.000	0.024	0.024
Collision with fixed object (from Worksheet 1F)	0.045	0.305	0.350
Collision with other object (from Worksheet 1F)	0.003	0.006	0.009
Other single-vehicle collision (from Worksheet 1F)	0.042	0.041	0.083
Collision with pedestrian (from Worksheet 1I)	0.088	0.000	0.088
Collision with bicycle (from Worksheet 1J)	0.023	0.000	0.023
Subtotal	0.201	0.375	0.576
otal	1.308	3.431	4.739

Worksheet 1L Summary Results for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)					
Crash Severity Level	Predicted average crash frequency, N predicted rs (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)					
	(Total) from Worksheet 1K		(2) / (3)					
Total	4.7	0.45	10.5					
atal and injury (FI)	1.3	0.45	2.9					
Property damage only (PDO)	3.4	0.45	7.6					

	heet 2A General Information and Input	Data for Urban and Suburban Ar			
General Informa	tion		Location Information		
Analyst	TL	Roadway	Montrose Rd		
Agency or Company	ATCS	Intersection	At Tower Oaks Blvd		
Date Performed	02/19/21	Jurisdiction	Montgomery County		
		Analysis Year	2045		
Input Data		Base Conditions	Site Conditions		
Intersection type (3ST, 3SG, 4ST, 4SG)			3SG		
AADT _{major} (veh/day)	$AADT_{MAX} = 58,100$ (veh/day)		70,150		
AADT _{minor} (veh/day)	AADT _{MAX} = 16,400 (veh/day)	-	12,655		
Intersection lighting (present/not present)		Not Present	Present		
Calibration factor, C _i		1.00	1.00		
Data for unsignalized intersections only:					
Number of major-road approaches with left-turn land	es (0,1,2)	0	0		
Number of major-road approaches with right-turn lai	nes (0,1,2)	0	0		
Data for signalized intersections only:					
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	2		
Number of approaches with right-turn lanes (0,1,2,3	(4) [for 3SG, use maximum value of 3]	0	2		
Number of approaches with left-turn signal phasing	[for 3SG, use maximum value of 3]		2		
Type of left-turn signal phasing for Leg #1		Permissive	Permissive / Protected		
Type of left-turn signal phasing for Leg #2			Protected		
Type of left-turn signal phasing for Leg #3			Not Applicable		
Type of left-turn signal phasing for Leg #4 (if applica	ble)		Not Applicable		
Number of approaches with right-turn-on-red prohib	ted [for 3SG, use maximum value of 3]	0	1		
Intersection red light cameras (present/not present)		Not Present	Not Present		
Sum of all pedestrian crossing volumes (PedVol)			6		
Maximum number of lanes crossed by a pedestrian	(141100)()		6		
Number of bus stops within 300 m (1,000 ft) of the in		0	4		
Schools within 300 m (1,000 ft) of the intersection (p		Not Present	Not Present		
Number of alcohol sales establishments within 300	m (1,000 ft) of the intersection	0	0		

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(6)	(7)				
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF				
	Phasing									
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}				
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)				
0.86	0.93	0.92	0.98	0.91	1.00	0.66				

	Worksheet 2C Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections											
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Crash Severity Level	S	PF Coefficien	ts	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
-			Parameter, k	Initial N _{bimv}	Crashes	N _{bimv}	CMFs	Factor, C _i	N_{bimv}			
	fr	from Table 12-10		from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from	Ī	(6)*(7)*(8)		
	а	b	С	IIOIII Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)		
Total	-12.13	1.11	0.26	0.33	15.055	1.000	15.055	0.66	1.00	9.910		
Fotal and Injury (FI)	-11.58	1.02	0.17	0.30	4.005	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	4.330	0.00	1.00	2.850		
Fatal and Injury (FI)	-11.50	1.02	0.17	0.30	0.30 4.085		4.330	0.66	1.00	2.050		
Property Damage Only (PDO)	-13.24	1.14	0.30	0.36	10.118	(5) _{TOTAL} -(5) _{FI} 0.712	10.725	0.66	1.00	7.060		

	Worksheet 2D Multiple-	Vehicle Collisions by Collis	sion Type for Urban and Suburb	an Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N bimv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv} (TOTAL) (crashes/year)
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C
Total	1.000	2.850	1.000	7.060	9.910
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.549	1.565	0.546	3.855	5.420
Head-on collision	0.038	0.108	0.020	0.141	0.250
Angle collision	0.280	0.798	0.204	1.440	2.238
Sideswipe	0.076	0.217	0.032	0.226	0.443
Other multiple-vehicle collision	0.057	0.162	0.198	1.398	1.560

		Worksheet	2E Single-V	ehicle Collisions by Severi	ty Level for Urban	and Suburban Arterial In	ersections				
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
			Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}		
Crash Severity Level	fr	om Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)	
	а	b	С		from Table 12-12	(FI) from Eqn. 12-		(T)TOTAL (O)	Worksheet 2B		(0) (1) (0)
	а	ь	· ·		24 or 12-27						
Total	-9.02	0.42	0.40	0.36	0.574	1.000	0.574	0.66	1.00	0.378	
Fatal and Injury (FI)	-9.75	0.27	0.51	0.24	0.147	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.157	0.66	1.00	0.103	
Fatai and injury (FI)	-9.75	0.27	0.51	0.24	0.24		1 0.137 0.00		1.00	0.103	
Property Damage Only	0.00	0.45	0.22	0.53	0.200	(5) _{TOTAL} -(5) _{FI}	0.447	0.66	4.00	0.075	
(PDO)	-9.08	0.45	0.33	0.53	0.390	0.727	0.417	0.66	1.00	0.275	

	Worksheet 2F Single-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections										
(1)	(2)	(3)	(4)	(5)	(6)						
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bisv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv} (TOTAL) (crashes/year)						
	from Table 12-13	(9)FI from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E						
Total	1.000	0.103	1.000	0.275	0.378						
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)						
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000						
Collision with animal	0.001	0.000	0.003	0.001	0.001						
Collision with fixed object	0.653	0.067	0.895	0.246	0.313						
Collision with other object	0.091	0.009	0.069	0.019	0.028						
Other single-vehicle collision	0.045	0.005	0.018	0.005	0.010						
Single-vehicle noncollision	0.209	0.022	0.014	0.004	0.025						

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(1) (2) (3) (4) (5)								
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}				
Crash Seventy Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total				-					
atal and injury (FI)				1					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections								
(1)	(2)	(3)	(4)						
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF						
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CiviF						
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)						
4.15	1.00	1.00	4.15						

		Workshe	et 2I Vehicle	-Pedestrian C	ollisions for l	Jrban and Suburba	n Arterial Signalized Inte	rsections		
(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	SPF Coefficients					Overdispersion	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}
Clash Severity Level		fı	om Table 12-1	4		Parameter, k	from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)
	а	b	С	d	е		IIOIII Equation 12-23	(4) HOITI WORKSHEET ZIT		(4) (3) (0)
Total	-6.60	0.05	0.24	0.41	0.09	0.52	0.006	4.15	1.00	0.024
Fatal and Injury (FI)							1		1.00	0.024

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(7)*				
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}				
Crash Seventy Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)				
Total	9.910	0.378	10.288	0.011	0.113				
Fatal and injury (FI)					0.113				

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE	·	
Rear-end collisions (from Worksheet 2D)	1.565	3.855	5.420
Head-on collisions (from Worksheet 2D)	0.108	0.141	0.250
Angle collisions (from Worksheet 2D)	0.798	1.440	2.238
Sideswipe (from Worksheet 2D)	0.217	0.226	0.443
Other multiple-vehicle collision (from Worksheet 2D)	0.162	1.398	1.560
Subtotal	2.850	7.060	9.910
	SINGLE-VEHICLE		
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.001	0.001
Collision with fixed object (from Worksheet 2F)	0.067	0.246	0.313
Collision with other object (from Worksheet 2F)	0.009	0.019	0.028
Other single-vehicle collision (from Worksheet 2F)	0.005	0.005	0.010
Single-vehicle noncollision (from Worksheet 2F)	0.022	0.004	0.025
Collision with pedestrian (from Worksheet 2G or 2I)	0.024	0.000	0.024
Collision with bicycle (from Worksheet 2J)	0.113	0.000	0.113
Subtotal	0.240	0.275	0.515
Total	3.090	7.335	10.425

Worksheet 2L Summary Results for Urban and Suburban Arterial Intersections							
(1)	(2)						
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)						
	(Total) from Worksheet 2K						
Total	10.4						
Fatal and injury (FI)	3.1						
Property damage only (PDO)	7.3						

		and Input D	ata for Urban and Suburbaı	Roadway Segment	S	
General Information			Location Information			
Analyst	TL		Roadway		Tower Oaks Blvd	
Agency or Company	ATCS		Roadway Section		Montrose Rd to I-270 NB Ramps	
Date Performed	02/19/21		Jurisdiction		Montgomery County	
			Analysis Year		2045	
Input Data			Base Conditions		Site Conditions	
Roadway type (2U, 3T, 4U, 4D, ST)					4U	
Length of segment, L (mi)					0.17	
AADT (veh/day)	$AADT_{MAX} = 40,100$	(veh/day)			13,608	
Type of on-street parking (none/parallel/angle)			None		None	
Proportion of curb length with on-street parking					0	
Median width (ft) - for divided only			15		Not Present	
Lighting (present / not present)			Not Present		Present	
Auto speed enforcement (present / not present)			Not Present		Not Present	
Major commercial driveways (number)					0	
Minor commercial driveways (number)					1	
Major industrial / institutional driveways (number)					0	
Minor industrial / institutional driveways (number)					0	
Major residential driveways (number)					0	
Minor residential driveways (number)					0	
Other driveways (number)					0	
Speed Category				Po	sted Speed Greater than 30 mph	
Roadside fixed object density (fixed objects / mi)			0		195	
Offset to roadside fixed objects (ft) [If greater than 30 or Not Pr	esent, input 30]		30		14	
Calibration Factor, Cr			1.00		1.00	

	Worksheet 1B Crash Modification Factors for Urban and Suburban Roadway Segments										
(1)	(2)	(3)	(4)	(5)	(6)						
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF						
CMF 1r	CMF 2r	CMF 3r	CMF 4r	CMF 5r	CMF comb						
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)						
1.00	1.47	1.00	0.92	1.00	1.35						

	Workshee	et 1C Multipl	e-Vehicle Nondriveway C	ollisions by Severity Level	for Urban and Suburba		egments				
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Crash Severity Level	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
•			Parameter, k	Initial N _{brmv}	Crashes	N _{brmv}	CMFs	Factor, Cr	N _{brmv}		
	from Table 12-3		from Table 12-3	om Table 12-3 from Equation 12-10		from Table 12-3 from Equation 12-10		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)
	а	b	Hom Table 12-3	Hom Equation 12-10		(T)IOIAL (O)	Worksheet 1B		(0) (1) (0)		
Total	-11.63	1.33	1.01	0.476	1.000	0.476	1.35	1.00	0.643		
Fatal and Injury (FI)	-12.08	1.25	0.99	0.142	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.149	1.35	1.00	0.201		
Fatal and injury (FI)	-12.00	1.25	0.99	0.142	0.313	0.149	1.33	1.00	0.201		
Dronauti Damasa Only (DDO)	40.50	4.20	4.00	0.044	(5) _{TOTAL} -(5) _{FI}	0.227	4.05	1.00	0.440		
Property Damage Only (PDO)	-12.53	1.38	1.08	0.311	0.687	0.327	1.35	1.00	0.442		

Wo	rksheet 1D Multiple-Vehicle No	ndriveway Collisions by	Collision Type for Urban ar	d Suburban Roadway Se	egments
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N brmv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N brmv (PDO) (crashes/year)	Predicted N _{brmv (TOTAL)} (crashes/year)
	from Table 12-4	(9)FI from Worksheet 1C	from Table 12-4	(9)PDO from Worksheet 1C	(9)TOTAL from Worksheet 1C
Total	1.000	0.201	1.000	0.442	0.643
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.511	0.103	0.506	0.223	0.326
Head-on collision	0.077	0.015	0.004	0.002	0.017
Angle collision	0.181	0.036	0.130	0.057	0.094
Sideswipe, same direction	0.093	0.019	0.249	0.110	0.129
Sideswipe, opposite direction	0.082	0.016	0.031	0.014	0.030
Other multiple-vehicle collision	0.056	0.011	0.080	0.035	0.047

	W	orksheet 1E -	- Single-Vehicle Collisions I	by Severity Level for Urba	an and Suburban Road	vay Segments	;			
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
Crash Severity Level			Parameter, k	Initial N _{brsv}	Crashes	N_{brsv}	CMFs	Factor, Cr	N_{brsv}	
Clasii Severity Lever	from Ta	ble 12-5	from Table 12-5	Table 12-5 from Equation 12-13		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)	
	a	b	Hom rable 12-5	Hom Equation 12-15		(T)TOTAL (O)	Worksheet 1B		(0) (1) (0)	
Total	-7.99	0.81	0.91	0.128	1.000	0.128	1.35	1.00	0.173	
Fatal and Injury (FI)	-7.37	0.61	0.54	0.036	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.033	1.35	1.00	0.045	
ratarana injury (i i)	-1.51	0.01	0.54	0.000	0.257	0.000	1.55	1.00	0.043	
Property Demoge Only (PDO)	-8.50	0.84	0.97	0.103	(5) _{TOTAL} -(5) _{FI}	0.095	1.35	1.00	0.129	
Property Damage Only (PDO)	-0.50	0.04	0.97	0.103	0.743	0.095	1.35	1.00	0.129	

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N brsv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N brsv (PDO) (crashes/year)	Predicted N _{brsv (TOTAL)} (crashes/year)
,	from Table 12-6	(9) _{FI} from Worksheet 1E	from Table 12-6	(9)PDO from Worksheet 1E	(9)TOTAL from Worksheet 1E
Total	1.000	0.045	1.000	0.129	0.173
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.001	0.000	0.001	0.000	0.000
Collision with fixed object	0.612	0.027	0.809	0.104	0.132
Collision with other object	0.020	0.001	0.029	0.004	0.005
Other single-vehicle collision	0.367	0.016	0.161	0.021	0.037

Worksheet	1G Multiple-Vehicle Drive	way-Related Collisions by	y Driveway Type for Urban	and Suburban Roadway Segments	
(1)	(2)	(3)	(4)	(5)	(6)
Deliveryary Type	Number of driveways,	Crashes per driveway per year, N _j	Coefficient for traffic adjustment, t	Initial N _{brdwy}	Overdispersion parameter, k
Driveway Type	n _i	from Table 12-7	from Table 12-7	Equation 12-16	from Table 12-7
		HOIH Table 12-7	ITOTTI TABLE 12-7	n _j * N _j * (AADT/15,000) ^t	IIOIII Table 12-7
Major commercial	0	0.182	1.172	0.000	
Minor commercial	1	0.058	1.172	0.052	
Major industrial/institutional	0	0.198	1.172	0.000	
Minor industrial/institutional	0	0.026	1.172	0.000	
Major residential	0	0.096	1.172	0.000	
Minor residential	0	0.018	1.172	0.000	
Other	0	0.029	1.172	0.000	
Total				0.052	0.81

Worksheet 1H Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)	(7)			
Create Cavarity Laval	Initial N _{brdwy}	Proportion of total	Adjusted	Combined CMFs		Predicted N _{brdwy}			
	,	crashes (f _{dwy})	N_{brdwy}	Combined Civil's	Calibration factor, C,	Tredicted Nordwy			
Crash Severity Level	(5) _{TOTAL} from Worksheet	from Table 12-7	(2) * (3)	(6) from Worksheet 1B	Calibration factor, C _r	(4)*(5)*(6)			
	1G	IIOIII TAble 12-7	(Z)TOTAL (3)	(0) Holli Worksheet 1B		(4) (3) (6)			
Total	0.052	1.000	0.052	1.35	1.00	0.070			
Fatal and injury (FI)		0.342	0.018	1.35	1.00	0.024			
Property damage only (PDO)		0.658	0.034	1.35	1.00	0.046			

Worksheet 1I Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments										
(1)	(2)	(3)	(4)	(5)	(6)	(8)*				
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{pedr}	Predicted N _{pedr}				
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8	(5)*(6)				
Total	0.643	0.173	0.070	0.886	0.009	0.008				
Fatal and injury (FI)						0.008				

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-19

	Worksheet 1J Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments										
(1)	(2)	(3)	(4)	(5)	(6)	(8)*					
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{biker}	Predicted N _{biker}					
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9	(5)*(6)					
Total	0.643	0.173	0.070	0.886	0.002	0.002					
Fatal and injury (FI)						0.002					

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-20

	et 1K Crash Severity Distribution for Urban		(4)
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 1D and 1F;	(5) from Worksheet 1D and 1F; and	(6) from Worksheet 1D and 1F;
Somsion type	(7) from Worksheet 1H; and	(7) from Worksheet 1H	(7) from Worksheet 1H; and
	(8) from Worksheet 1I and 1J		(8) from Worksheet 1I and 1J
	MULTIPLE-VEHICLE		
Rear-end collisions (from Worksheet 1D)	0.103	0.223	0.326
Head-on collisions (from Worksheet 1D)	0.015	0.002	0.017
Angle collisions (from Worksheet 1D)	0.036	0.057	0.094
Sideswipe, same direction (from Worksheet 1D)	0.019	0.110	0.129
Sideswipe, opposite direction (from Worksheet 1D)	0.016	0.014	0.030
Oriveway-related collisions (from Worksheet 1H)	0.024	0.046	0.070
Other multiple-vehicle collision (from Worksheet 1D)	0.011	0.035	0.047
Subtotal	0.225	0.488	0.712
	SINGLE-VEHICLE		
Collision with animal (from Worksheet 1F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 1F)	0.027	0.104	0.132
Collision with other object (from Worksheet 1F)	0.001	0.004	0.005
Other single-vehicle collision (from Worksheet 1F)	0.016	0.021	0.037
Collision with pedestrian (from Worksheet 1I)	0.008	0.000	0.008
Collision with bicycle (from Worksheet 1J)	0.002	0.000	0.002
Subtotal	0.054	0.129	0.183
Total	0.279	0.616	0.896

Worksheet 1L Summary Results for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)					
Crash Severity Level	Predicted average crash frequency, N predicted rs (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)					
	(Total) from Worksheet 1K		(2) / (3) 5.3					
Total	0.9	0.17	5.3					
Fatal and injury (FI)	0.3	0.17	1.6					
Property damage only (PDO)	0.6	0.17	3.6					

	Worksheet 2A General Information and Input	Data for Orban and Suburban Arte			
	al Information		Location Information		
Analyst	TL	Roadway	Tower Oaks Blvd		
Agency or Company	ATCS	Intersection	At I-270 NB Ramps/Geico Ent.		
Date Performed	02/19/21	Jurisdiction	Montgomery County		
	. = .	Analysis Year	2045		
	nput Data	Base Conditions	Site Conditions 4SG		
Intersection type (3ST, 3SG, 4ST, 4SG)	$AADT_{MAX} = 67.700 (veh/dav)$				
AADT _{major} (veh/day)		-	12,484		
AADT _{minor} (veh/day)	$AADT_{MAX} = 33,400 (veh/day)$		9,272		
Intersection lighting (present/not present)		Not Present	Present		
Calibration factor, C _i		1.00	1.00		
Data for unsignalized intersections only:					
Number of major-road approaches with le	eft-turn lanes (0,1,2)	0	0		
Number of major-road approaches with r	ight-turn lanes (0,1,2)	0	0		
Data for signalized intersections only:					
Number of approaches with left-turn lane	s (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	1		
Number of approaches with right-turn lan	es (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	1		
Number of approaches with left-turn sign	al phasing [for 3SG, use maximum value of 3]		2		
Type of left-turn signal phasing for Leg #	1	Permissive	Protected		
Type of left-turn signal phasing for Leg #	2		Permissive		
Type of left-turn signal phasing for Leg #			Protected		
Type of left-turn signal phasing for Leg #	4 (if applicable)		Permissive		
11 0	-red prohibited [for 3SG, use maximum value of 3]	0	0		
Intersection red light cameras (present/ne		Not Present	Not Present		
Sum of all pedestrian crossing volumes			123		
Maximum number of lanes crossed by a	i (idilosk)		4		
Number of bus stops within 300 m (1,000	,	0	4		
Schools within 300 m (1,000 ft) of the inte	\1 /	Not Present	Not Present		
Number of alcohol sales establishments	within 300 m (1,000 ft) of the intersection	0	0		

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(6)	(7)				
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF				
	Phasing									
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}				
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)				
0.90	0.94	0.96	1.00	0.91	1.00	0.74				

		Worksheet	2C Multiple-	Vehicle Collisions by Sever	rity Level for Urban	and Suburban Arterial I	ntersections			
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
Crash Severity Level	S	PF Coefficien	ts	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
-			Parameter, k	Initial N _{bimv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bimv}	
	fr	om Table 12-1	Table 12-10 from Table 12-10		from Equation 12-		(4) _{TOTAL} *(5)	(7) from	(6)*(7)*(8)	
	а	b	С	Holli Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)
Total	-10.99	1.07	0.23	0.39	3.332	1.000	3.332	0.74	1.00	2.464
Fotal and Injuny (FI)	-13.14	1.18	0.22	0.33	$(4)_{\text{FI}}/((4)_{\text{FI}}+(4)_{\text{PDO}})$	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	1.037 0	0.74	1.00	0.767
Fatal and Injury (FI)	-13.14	1.10	0.22	0.33	1.000	0.311	1.037	0.74	1.00	0.767
Property Damage Only	44.00	4.00	0.04	0.44	0.040	(5) _{TOTAL} -(5) _{FI}	0.004	0.74	4.00	4.007
(PDO)	-11.02	1.02	0.24	0.44	2.210	0.689	2.294	0.74	1.00	1.697

	Worksheet 2D Multiple-	Vehicle Collisions by Collis	sion Type for Urban and Suburb	an Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bimv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv (TOTAL)} (crashes/year)
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C
Total	1.000	0.767	1.000	1.697	2.464
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.450	0.345	0.483	0.820	1.165
Head-on collision	0.049	0.038	0.030	0.051	0.089
Angle collision	0.347	0.266	0.244	0.414	0.680
Sideswipe	0.099	0.076	0.032	0.054	0.130
Other multiple-vehicle collision	0.055	0.042	0.211	0.358	0.400

	Worksheet 2E Single-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections										
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
	SPF Coefficients		ts	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
			Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}		
Crash Severity Level	fr	om Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)	
	а	b	С	from Table 12-12	(FI) from Eqn. 12-		(T)TOTAL (O)	Worksheet 2B		(0) (1) (0)	
	а	b	· ·		24 or 12-27						
Total	-10.21	0.68	0.27	0.36	0.265	1.000	0.265	0.74	1.00	0.196	
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.078	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.079	0.74	1.00	0.059	
Fatal and injury (FI)	-9.25	0.43	0.29	0.09	0.076	0.300	0.079	0.74	1.00	0.039	
Property Damage Only	44.04	0.70	0.05	0.44	0.400	(5) _{TOTAL} -(5) _{FI}	0.405	0.74	4.00	0.407	
(PDO)	-11.34	0.78	0.25	0.44	0.183	0.700	0.185	0.74	1.00	0.137	

	Worksheet 2F Single-V	ehicle Collisions by Collisi	on Type for Urban and Suburba	n Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bisv} (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv (TOTAL)} (crashes/year)
	from Table 12-13	(9)FI from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.059	1.000	0.137	0.196
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.000	0.000
Collision with fixed object	0.744	0.044	0.870	0.119	0.163
Collision with other object	0.072	0.004	0.070	0.010	0.014
Other single-vehicle collision	0.040	0.002	0.023	0.003	0.005
Single-vehicle noncollision	0.141	0.008	0.034	0.005	0.013

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(2)	(3)	(4)	(5)	(7)*				
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}				
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total		1							
Fatal and injury (FI)		-		-					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections									
(1)	(2)	(3)	(4)							
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF							
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CiviF							
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)							
4.15	1.00	1.00	4.15							

	Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections											
(1)	(2)					(3)	(4)	(5)	(6)	(7)		
Crash Severity Level		S	PF Coefficien	ts		Overdispersion	n N _{pedbase} Combined CMF			Predicted N _{pedi}		
Crash Seventy Level		from Table 12-14					from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)		
	а	b	С	d	е		Hom Equation 12-29	(4) HOIH WORKSHEEL ZIT		(4) (3) (0)		
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.037	4.15	1.00	0.155		
Fatal and Injury (FI)							1		1.00	0.155		

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections										
(1)	(2)	(3)	(4)	(5)	(7)*					
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}					
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)					
Total	2.464	0.196	2.660	0.015	0.040					
Fatal and injury (FI)				-	0.040					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksh	eet 2K Crash Severity Distribution for Urban a	nd Suburban Arterial Intersections	
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE		• • •
Rear-end collisions (from Worksheet 2D)	0.345	0.820	1.165
Head-on collisions (from Worksheet 2D)	0.038	0.051	0.089
Angle collisions (from Worksheet 2D)	0.266	0.414	0.680
Sideswipe (from Worksheet 2D)	0.076	0.054	0.130
Other multiple-vehicle collision (from Worksheet 2D)	0.042	0.358	0.400
Subtotal	0.767	1.697	2.464
	SINGLE-VEHICLE		
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 2F)	0.044	0.119	0.163
Collision with other object (from Worksheet 2F)	0.004	0.010	0.014
Other single-vehicle collision (from Worksheet 2F)	0.002	0.003	0.005
Single-vehicle noncollision (from Worksheet 2F)	0.008	0.005	0.013
Collision with pedestrian (from Worksheet 2G or 2I)	0.155	0.000	0.155
Collision with bicycle (from Worksheet 2J)	0.040	0.000	0.040
Subtotal	0.254	0.137	0.391
Total	1.021	1.834	2.855

Worksheet 2L Summary Results for Urban and Suburban Arterial Intersections							
(1)	(2)						
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)						
	(Total) from Worksheet 2K						
Total	2.9						
Fatal and injury (FI)	1.0						
Property damage only (PDO)	1.8						

Works	heet 2A General Information and Input	Data for Urban and Suburban A	rterial Intersectio	ns	
General Informa	tion		Location	Information	
Analyst	TL	Roadway		MD 28 Key W Ave	
Agency or Company	ATCS	Intersection	Intersection At Omega Dr/M		
Date Performed	02/17/21	Jurisdiction		Montgomery County	
	Analysis Year 2045				
Input Data		Base Conditions		Site Conditions	
Intersection type (3ST, 3SG, 4ST, 4SG)				4SG	
AADT _{major} (veh/day)	$AADT_{MAX} = 67,700 (veh/day)$	-		28,732	
AADT _{minor} (veh/day)	$AADT_{MAX} = 33,400$ (veh/day)			11,341	
Intersection lighting (present/not present)		Not Present		Present	
Calibration factor, C _i		1.00		1.00	
Data for unsignalized intersections only:					
Number of major-road approaches with left-turn land	es (0,1,2)	0		0	
Number of major-road approaches with right-turn la	nes (0,1,2)	0		0	
Data for signalized intersections only:					
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]	0		4	
Number of approaches with right-turn lanes (0,1,2,3	,4) [for 3SG, use maximum value of 3]	0		4	
Number of approaches with left-turn signal phasing	[for 3SG, use maximum value of 3]			4	
Type of left-turn signal phasing for Leg #1		Permissive		Protected	
Type of left-turn signal phasing for Leg #2				Protected	
Type of left-turn signal phasing for Leg #3				Protected	
Type of left-turn signal phasing for Leg #4 (if applica	ble)			Protected	
Number of approaches with right-turn-on-red prohib	ted [for 3SG, use maximum value of 3]	0		0	
Intersection red light cameras (present/not present)		Not Present		Not Present	
Sum of all pedestrian crossing volumes (PedVol)	Signalized intersections only			260	
Maximum number of lanes crossed by a pedestrian	(n _{lanesx})			9	
Number of bus stops within 300 m (1,000 ft) of the in	ntersection	0		10	
Schools within 300 m (1,000 ft) of the intersection (p		Not Present		Not Present	
Number of alcohol sales establishments within 300	m (1,000 ft) of the intersection	0		0	

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections											
(1)	(2)	(3)	(4)	(5)	(6)	(7)						
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF						
	Phasing											
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}						
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)						
0.66	0.78	0.85	1.00	0.91	1.00	0.40						

	Worksheet 2C Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections												
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)			
Crash Severity Level	S	PF Coefficien	ts	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted			
				Parameter, k	Initial N _{bimv}	Crashes	N _{bimv}	CMFs	Factor, C _i	N_{bimv}			
	fr	from Table 12-10		from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from	Ī	(6)*(7)*(8)			
	а	b	С	IIOIII Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)			
Total	-10.99	1.07	0.23	0.39	8.514	1.000	8.514	0.40	1.00	3.393			
Fotal and Injury (FI)	12 14	1 10	0.22	0.33	2.794	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	2.893	0.40	1.00	1.153			
Fatal and Injury (FI)	-13.14	-13.14 1.18 0.	0.22	0.33	2.794	0.340	2.093	0.40	1.00	1.155			
Property Damage Only	44.00	4.00	0.04	0.44	F 400	(5) _{TOTAL} -(5) _{FI}	5 004	0.40	4.00	0.040			
(PDO)	-11.02	1.02	0.24	0.44	5.429	0.660	5.621	0.40	1.00	2.240			

	Worksheet 2D Multiple-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections										
(1)	(2)	(3)	(4)	(5)	(6)						
Collision Type	Proportion of Collision Predicted N bimv (F (crashes/year)		Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv (TOTAL)} (crashes/year)						
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C						
Total	1.000	1.153	1.000	2.240	3.393						
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)						
Rear-end collision	0.450	0.519	0.483	1.082	1.601						
Head-on collision	0.049	0.057	0.030	0.067	0.124						
Angle collision	0.347	0.400	0.244	0.547	0.947						
Sideswipe	0.099	0.114	0.032	0.072	0.186						
Other multiple-vehicle collision	0.055	0.063	0.211	0.473	0.536						

	Worksheet 2E Single-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections												
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)			
	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted			
			Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}				
Crash Severity Level	from Table 12-12				from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)			
	2	b	С	from Table 12-12	(FI) from Eqn. 12-		(T)TOTAL (S)	Worksheet 2B		(0) (1) (0)			
	а	b	C					24 or 12-27					
Total	-10.21	0.68	0.27	0.36	0.492	1.000	0.492	0.40	1.00	0.196			
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.119	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.120	0.40	1.00	0.048			
Fatal and injury (FI)	-9.25	9.25 0.43 0.29 0.09	0.119	0.244	0.120	0.40	1.00	0.048					
Property Damage Only	44.04	0.70	0.05	0.44	0.260	(5) _{TOTAL} -(5) _{FI}	0.272	0.40	4.00	0.440			
(PDO)	-11.34	0.78	0.25	0.44	0.368	0.756	0.372	0.40	1.00	0.148			

	Worksheet 2F Single-V	ehicle Collisions by Collis	ion Type for Urban and Suburba	n Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bisv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv (TOTAL)} (crashes/year)
	from Table 12-13	(9) _{FI} from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.048	1.000	0.148	0.196
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.000	0.000
Collision with fixed object	0.744	0.036	0.870	0.129	0.165
Collision with other object	0.072	0.003	0.070	0.010	0.014
Other single-vehicle collision	0.040	0.002	0.023	0.003	0.005
Single-vehicle noncollision	0.141	0.007	0.034	0.005	0.012

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(2)	(3)	(4)	(5)	(7)*				
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}				
Crash Seventy Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total									
Fatal and injury (FI)				-					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections									
(1)	(1) (2) (3) (4)									
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF							
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CMF							
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)							
4.15	1.00	1.00	4.15							

Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections											
(1)	(2)					(3)	(4)	(5)	(6)	(7)	
Crash Severity Level	SPF Coefficients			Overdispersion	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}			
Crash Seventy Level		from Table 12-14					from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)	
	а	b	С	d	е		IIOIII Equation 12-23	(4) HOITI WORKSHEET ZIT		(+) (0) (0)	
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.069	4.15	1.00	0.287	
Fatal and Injury (FI)							1	-	1.00	0.287	

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections									
(1)	(2)	(2) (3) (4) (5)							
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}				
Crash Severity Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)				
Total	3.393	0.196	3.590	0.015	0.054				
Fatal and injury (FI)					0.054				

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksr	neet 2K Crash Severity Distribution for Urban a	nd Suburban Arterial Intersections	
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE	·	
Rear-end collisions (from Worksheet 2D)	0.519	1.082	1.601
Head-on collisions (from Worksheet 2D)	0.057	0.067	0.124
Angle collisions (from Worksheet 2D)	0.400	0.547	0.947
Sideswipe (from Worksheet 2D)	0.114	0.072	0.186
Other multiple-vehicle collision (from Worksheet 2D)	0.063	0.473	0.536
Subtotal	1.153	2.240	3.393
	SINGLE-VEHICLE		•
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 2F)	0.036	0.129	0.165
Collision with other object (from Worksheet 2F)	0.003	0.010	0.014
Other single-vehicle collision (from Worksheet 2F)	0.002	0.003	0.005
Single-vehicle noncollision (from Worksheet 2F)	0.007	0.005	0.012
Collision with pedestrian (from Worksheet 2G or 2I)	0.287	0.000	0.287
Collision with bicycle (from Worksheet 2J)	0.054	0.000	0.054
Subtotal	0.389	0.148	0.537
Total	1.542	2.389	3.931

Worksheet 2L Summary Resu	ults for Urban and Suburban Arterial Intersections
(1)	(2)
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)
	(Total) from Worksheet 2K
Total	3.9
Fatal and injury (FI)	1.5
Property damage only (PDO)	2.4

Worksheet	1A General Information	and Input D	ata for Urban and Suburbaı	n Roadway	Segments	
General Information					Location Information	
Analyst	TL		Roadway		Omega Dr	
Agency or Company	ATCS		Roadway Section		MD 28 to Research Blvd	
Date Performed	02/17/21		Jurisdiction			
			Analysis Year		2045	
Input Data			Base Conditions		Site Conditions	
Roadway type (2U, 3T, 4U, 4D, ST)					4D	
Length of segment, L (mi)					0.04	
AADT (veh/day)	$AADT_{MAX} = 66,000$	(veh/day)			11,796	
Type of on-street parking (none/parallel/angle)			None		None	
Proportion of curb length with on-street parking					0	
Median width (ft) - for divided only			15		10	
Lighting (present / not present)			Not Present		Present	
Auto speed enforcement (present / not present)			Not Present		Not Present	
Major commercial driveways (number)					0	
Minor commercial driveways (number)					0	
Major industrial / institutional driveways (number)					0	
Minor industrial / institutional driveways (number)					0	
Major residential driveways (number)					0	
Minor residential driveways (number)					0	
Other driveways (number)					0	
Speed Category					Posted Speed Greater than 30 mph	
Roadside fixed object density (fixed objects / mi)			0		0	
Offset to roadside fixed objects (ft) [If greater than 30 or Not Pr	esent, input 30]		30		30	
Calibration Factor, Cr			1.00		1.00	

	Worksheet 1B Crash Modification Factors for Urban and Suburban Roadway Segments										
(1)	(2)	(3)	(4)	(5)	(6)						
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF						
CMF 1r	CMF 2r	CMF 3r	CMF 4r	CMF 5r	CMF comb						
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)						
1.00	1.00	1.01	0.91	1.00	0.92						

	Workshee	et 1C Multipl	e-Vehicle Nondriveway Co	ollisions by Severity Level	for Urban and Suburba	ın Roadway S	egments		
(1)	(:	2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
-			Parameter, k	Initial N _{brmv}	Crashes	N _{brmv}	CMFs	Factor, Cr	N _{brmv}
	from Ta	ble 12-3	from Table 12-3	from Equation 12-10		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)
	а	b	IIOIII TAble 12-3	IIOIII Equation 12-10		(T)TOTAL (U)	Worksheet 1B		(0) (1) (0)
Total	-12.34	1.36	1.32	0.060	1.000	0.060	0.92	1.00	0.056
Fatal and Injury (FI)	-12.76	1.28	1.31	0.019	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.018	0.92	1.00	0.016
ratar and injury (FI)	-12.76	1.20	1.31	0.019	0.292	0.016	0.92	1.00	0.016
Description Description (DDO)	40.04	4.00	4.04	0.045	(5) _{TOTAL} -(5) _{FI}	0.040	0.00	4.00	0.000
Property Damage Only (PDO)	-12.81	1.38	1.34	0.045	0.708	0.043	0.92	1.00	0.039

Wor	ksheet 1D Multiple-Vehicle No	ndriveway Collisions by	Collision Type for Urban an	id Suburban Roadway Se	egments	
(1)	(2)	(3)	(4)	(5)	(6)	
Collision Type	Proportion of Collision Type(FI)	Predicted N brmv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N brmv (PDO) (crashes/year)	Predicted N _{brmv (TOTAL)} (crashes/year)	
	from Table 12-4 (9)FI from Workshee		from Table 12-4	(9)PDO from Worksheet 1C	(9)тотаL from Worksheet 1С	
Total	1.000	0.016	1.000	0.039	0.056	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Rear-end collision	0.832	0.014	0.662	0.026	0.040	
Head-on collision	0.020	0.000	0.007	0.000	0.001	
Angle collision	0.040	0.001	0.036	0.001	0.002	
Sideswipe, same direction	0.050	0.001	0.223	0.009	0.010	
Sideswipe, opposite direction	0.010	0.000	0.001	0.000	0.000	
Other multiple-vehicle collision	0.048	0.001	0.071	0.003	0.004	

	Worksheet 1E Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments										
(1)	(2)		(3)	(3)		(6)	(7)	(8)	(9)		
	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
Crash Severity Level			Parameter, k	Initial N _{brsv}	Crashes	N _{brsv}	CMFs	Factor, Cr	N _{brsv}		
Clasii Severity Level	from Ta	ble 12-5	from Table 12-5	from Equation 12-13	from Equation 12.13		(4) _{TOTAL} *(5)			(6)*(7)*(8)	
	а	b	Holli Table 12-3	Hom Equation 12-13		(+)TOTAL (3)	Worksheet 1B		(0) (1) (0)		
Total	-5.05	0.47	0.86	0.021	1.000	0.021	0.92	1.00	0.019		
Fatal and Injury (FI)	-8.71	0.66	0.28	0.003	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.003	0.92	1.00	0.003		
i atai and injury (i i)	-0.71	0.00	0.20	0.003	0.154	0.003	0.92	1.00	0.003		
Dramarti Damara Only (DDO)	-5.04	0.45	1.00	0.040	(5) _{TOTAL} -(5) _{FI}	0.018	0.92	1.00	0.016		
Property Damage Only (PDO)	-5.04	0.45	1.06	0.018	0.846	0.018	0.92	1.00	0.016		

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N brsv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N brsv (PDO) (crashes/year)	Predicted N _{brsv (TOTAL)} (crashes/year)
,	from Table 12-6	(9) _{FI} from Worksheet 1E	from Table 12-6	(9)PDO from Worksheet 1E	(9)TOTAL from Worksheet 1E
Total	1.000	0.003	1.000	0.016	0.019
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.001	0.000	0.063	0.001	0.001
Collision with fixed object	0.500	0.001	0.813	0.013	0.015
Collision with other object	0.028	0.000	0.016	0.000	0.000
Other single-vehicle collision	0.471	0.001	0.108	0.002	0.003

Work	sheet 1G Multiple-Vehicle Drive	way-Related Collisions by	y Driveway Type for Urban	and Suburban Roadway Segments	
(1)	(2)	(2) (3) (4) (5)		(5)	(6)
Driveway Type	Number of driveways,	Crashes per driveway per year, N _j	Coefficient for traffic adjustment, t	Initial N _{brdwy}	Overdispersion parameter, k
	n _i	from Table 12-7	from Table 12-7	Equation 12-16	from Table 12-7
	•	IIOIII Table 12-7		n _j * N _j * (AADT/15,000) ^t	IIOIII Table 12-7
Major commercial	0	0.033	1.106	0.000	
Minor commercial	0	0.011	1.106	0.000	
Major industrial/institutional	0	0.036	1.106	0.000	
Minor industrial/institutional	0	0.005	1.106	0.000	
Major residential	0	0.018	1.106	0.000	
Minor residential	0	0.003	1.106	0.000	
Other	0	0.005	1.106	0.000	
Total				0.000	1.39

Worksheet 1H Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)	(7)			
Crash Severity Level	Initial N _{brdwy}	Proportion of total crashes (f _{dwy})	Adjusted N _{brdwy}	Combined CMFs	Calibration factor, C,	Predicted N _{brdwy}			
Crash Severity Level	(5) _{TOTAL} from Worksheet 1G	from Table 12-7	(2) _{TOTAL} * (3)	(6) from Worksheet 1B	, ,	(4)*(5)*(6)			
Total	0.000	1.000	0.000	0.92	1.00	0.000			
Fatal and injury (FI)		0.284	0.000	0.92	1.00	0.000			
Property damage only (PDO)		0.716	0.000	0.92	1.00	0.000			

	Worksheet 1I Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)	(8)*				
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{pedr}	Predicted N _{pedr}				
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8	(5)*(6)				
Total	0.056	0.019	0.000	0.075	0.019	0.001				
Fatal and injury (FI)						0.001				

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-19

	Worksheet 1J Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)	(8)*				
Crash Severity Level	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{biker}	Predicted N _{biker}				
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9	(5)*(6)				
Total	0.056	0.019	0.000	0.075	0.005	0.000				
Fatal and injury (FI)						0.000				

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-20

	et 1K Crash Severity Distribution for Urban a		(4)
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 1D and 1F;	(5) from Worksheet 1D and 1F; and	(6) from Worksheet 1D and 1F;
omoron typo	(7) from Worksheet 1H; and	(7) from Worksheet 1H	(7) from Worksheet 1H; and
	(8) from Worksheet 1I and 1J		(8) from Worksheet 1I and 1J
	MULTIPLE-VEHICLE		
Rear-end collisions (from Worksheet 1D)	0.014	0.026	0.040
Head-on collisions (from Worksheet 1D)	0.000	0.000	0.001
Angle collisions (from Worksheet 1D)	0.001	0.001	0.002
Sideswipe, same direction (from Worksheet 1D)	0.001	0.009	0.010
Sideswipe, opposite direction (from Worksheet 1D)	0.000	0.000	0.000
Oriveway-related collisions (from Worksheet 1H)	0.000	0.000	0.000
Other multiple-vehicle collision (from Worksheet 1D)	0.001	0.003	0.004
Subtotal	0.016	0.039	0.056
	SINGLE-VEHICLE		
Collision with animal (from Worksheet 1F)	0.000	0.001	0.001
Collision with fixed object (from Worksheet 1F)	0.001	0.013	0.015
Collision with other object (from Worksheet 1F)	0.000	0.000	0.000
Other single-vehicle collision (from Worksheet 1F)	0.001	0.002	0.003
Collision with pedestrian (from Worksheet 1I)	0.001	0.000	0.001
Collision with bicycle (from Worksheet 1J)	0.000	0.000	0.000
Subtotal	0.005	0.016	0.021
Total	0.021	0.056	0.077

Worksheet 1L Summary Results for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)						
Crash Severity Level	Predicted average crash frequency, N predicted rs (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)						
	(Total) from Worksheet 1K		(2) / (3)						
Total	0.1	0.04	1.9						
Fatal and injury (FI)	0.0	0.04	0.5						
Property damage only (PDO)	0.1	0.04	1.4						

Works	sheet 2A General Information and Input	Data for Urban and Suburban Arte	erial Intersections			
General Informa	ation		Location Information			
Analyst Agency or Company Date Performed	TL ATCS 02/17/21	Roadway Intersection Jurisdiction	Omega Dr At Research Blvd/Driveway Montgomery County			
		Analysis Year	2045			
Input Data		Base Conditions	Site Conditions 3ST			
Intersection type (3ST, 3SG, 4ST, 4SG)	$AADT_{MAX} = 45,700 \text{ (veh/day)}$		11.757			
AADT major (veh/day)	, , , , , , , , , , , , , , , , , , , ,		11,101			
AADT _{minor} (veh/day)	$AADT_{MAX} = 9,300 (veh/day)$		4,178			
Intersection lighting (present/not present)		Not Present	Present			
Calibration factor, C _i		1.00	1.00			
Data for unsignalized intersections only:			-			
Number of major-road approaches with left-turn lar	es (0,1,2)	0	1			
Number of major-road approaches with right-turn la	ines (0,1,2)	0	0			
Data for signalized intersections only:						
Number of approaches with left-turn lanes (0,1,2,3,	4) [for 3SG, use maximum value of 3]	0				
Number of approaches with right-turn lanes (0,1,2,3	3,4) [for 3SG, use maximum value of 3]	0				
Number of approaches with left-turn signal phasing	[for 3SG, use maximum value of 3]					
Type of left-turn signal phasing for Leg #1		Permissive				
Type of left-turn signal phasing for Leg #2						
Type of left-turn signal phasing for Leg #3						
Type of left-turn signal phasing for Leg #4 (if applic	able)					
Number of approaches with right-turn-on-red prohil	oited [for 3SG, use maximum value of 3]	0				
Intersection red light cameras (present/not present		Not Present				
Sum of all pedestrian crossing volumes (PedVol) -						
Maximum number of lanes crossed by a pedestriar	(Idilesk)					
Number of bus stops within 300 m (1,000 ft) of the		0				
Schools within 300 m (1,000 ft) of the intersection (Not Present				
Number of alcohol sales establishments within 300	m (1,000 ft) of the intersection	0				

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(6)	(7)				
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF				
	Phasing									
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}				
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)				
0.67	1.00	1.00	1.00	0.91	1.00	0.61				

(1)	(1) (2)		Vehicle Collisions by Seve	(4)	(5)	(6)	(7)	(8)	(9)	
Crash Severity Level SPF Coefficients		ts	Overdispersion Parameter, k	Initial N _{bimv}	Proportion of Total Crashes	Adjusted N _{bimv}	Combined CMFs	Calibration Factor, C _i	Predicted N _{bimv}	
	a fr	om Table 12-1 b	0 c	from Table 12-10	from Equation 12- 21		(4) _{TOTAL} *(5)	(7) from Worksheet 2B		(6)*(7)*(8)
Total	-13.36	1.11	0.41	0.80	1.587	1.000	1.587	0.61	1.00	0.969
Fatal and Injury (FI)	-14.01	1.16	0.30	0.69	0.529	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.320	0.507	0.61	1.00	0.310
Property Damage Only (PDO)	-15.38	1.20	0.51	0.77	1.126	(5) _{TOTAL} -(5) _{FI} 0.680	1.080	0.61	1.00	0.660

	Worksheet 2D Multiple-	Vehicle Collisions by Collis	sion Type for Urban and Suburb	an Arterial Intersections	·	
(1)	(2)	(3)	(4)	(5)	(6)	
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bimv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv (TOTAL)} (crashes/year)	
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C	
Total	1.000	0.310	1.000	0.660	0.969	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Rear-end collision	0.421	0.130	0.440	0.290	0.421	
Head-on collision	0.045	0.014	0.023	0.015	0.029	
Angle collision	0.343	0.106	0.262	0.173	0.279	
Sideswipe	0.126	0.039	0.040	0.026	0.065	
Other multiple-vehicle collision	0.065	0.020	0.235	0.155	0.175	

		Worksheet	2E Single-\	ehicle Collisions by Sever	ity Level for Urban a	and Suburban Arterial In	tersections			
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
			Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}	
Crash Severity Level	fr	om Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from		(6)*/7)*/9)
	а	b		from Table 12-12	(FI) from Eqn. 12-		(T)TOTAL (S)	Worksheet 2B		(6)*(7)*(8)
	а	b	С		24 or 12-27					
Total	-6.81	0.16	0.51	1.14	0.347	1.000	0.347	0.61	1.00	0.212
Fatal and Injury (FI)					0.108	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.108	0.61	1.00	0.066
ratarand injury (FI)					0.100	0.310	0.100	0.01	1.00	0.000
Property Damage Only	0.26	0.05	0.55	1.20	0.000	(5) _{TOTAL} -(5) _{FI}	0.000	0.64	4.00	0.146
(PDO)	-8.36	0.25	0.55	1.29	0.239	0.690	0.239	0.61	1.00	0.146

	Worksheet 2F Single-V	ehicle Collisions by Collis	ion Type for Urban and Suburba	n Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bisv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv (TOTAL)} (crashes/year)
	from Table 12-13	(9)FI from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.066	1.000	0.146	0.212
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.003	0.000	0.001
Collision with animal	0.003	0.000	0.018	0.003	0.003
Collision with fixed object	0.762	0.050	0.834	0.122	0.172
Collision with other object	0.090	0.006	0.092	0.013	0.019
Other single-vehicle collision	0.039	0.003	0.023	0.003	0.006
Single-vehicle noncollision	0.105	0.007	0.030	0.004	0.011

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(2)	(3)	(4)	(5)	(7)*				
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}				
Crash Severity Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total	0.969	0.212	1.181	0.021	0.025				
Fatal and injury (FI)					0.025				

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections									
(1)	(1) (2) (3)									
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF							
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CiviF							
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)							
										

Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections											
(1)	(2)					(3)	(4)	(5)	(6)	(7)	
Crash Severity Level	SPF Coefficients					Overdispersion	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}	
Crash Severity Level		f	rom Table 12-1	4		Parameter, k	from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)	
	а	b	С	d	е		IIOIII Equation 12-29	(4) Holli Worksheet 211		(4) (3) (0)	
Total			==						1.00		
Fatal and Injury (FI)									1.00		

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(7)*				
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}				
Crasii Severity Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)				
Total	0.969	0.212	1.181	0.016	0.019				
Fatal and injury (FI)					0.019				

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksh	neet 2K Crash Severity Distribution for Urban a	nd Suburban Arterial Intersections	
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE		
Rear-end collisions (from Worksheet 2D)	0.130	0.290	0.421
Head-on collisions (from Worksheet 2D)	0.014	0.015	0.029
Angle collisions (from Worksheet 2D)	0.106	0.173	0.279
Sideswipe (from Worksheet 2D)	0.039	0.026	0.065
Other multiple-vehicle collision (from Worksheet 2D)	0.020	0.155	0.175
Subtotal	0.310	0.660	0.969
	SINGLE-VEHICLE		•
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.001
Collision with animal (from Worksheet 2F)	0.000	0.003	0.003
Collision with fixed object (from Worksheet 2F)	0.050	0.122	0.172
Collision with other object (from Worksheet 2F)	0.006	0.013	0.019
Other single-vehicle collision (from Worksheet 2F)	0.003	0.003	0.006
Single-vehicle noncollision (from Worksheet 2F)	0.007	0.004	0.011
Collision with pedestrian (from Worksheet 2G or 2I)	0.025	0.000	0.025
Collision with bicycle (from Worksheet 2J)	0.019	0.000	0.019
Subtotal	0.110	0.146	0.256
Total	0.419	0.806	1.225

Worksheet 2L Summary Resu	Its for Urban and Suburban Arterial Intersections
(1)	(2)
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)
	(Total) from Worksheet 2K
Total	1.2
Fatal and injury (FI)	0.4
Property damage only (PDO)	0.8

Worksheet	1A General Inf	formation	and Input D	ata for Urban and Suburba	n Roadway	Segments		
General Information			-			Location Information		
Analyst		TL		Roadway		Omega Dr		
Agency or Company	ATCS			Roadway Section		Research Blvd to I-270 SB Off-Ramp		
Date Performed	0)2/17/21		Jurisdiction				
				Analysis Year		2045		
Input Data				Base Conditions		Site Conditions		
Roadway type (2U, 3T, 4U, 4D, ST)	· · · · · · · · · · · · · · · · · · ·					4D		
Length of segment, L (mi)						0.24		
AADT (veh/day)	AADT _{MAX} =	66,000	(veh/day)			11,724		
Type of on-street parking (none/parallel/angle)				None		None		
Proportion of curb length with on-street parking						0		
Median width (ft) - for divided only				15		15		
Lighting (present / not present)				Not Present		Present		
Auto speed enforcement (present / not present)				Not Present		Not Present		
Major commercial driveways (number)						0		
Minor commercial driveways (number)						0		
Major industrial / institutional driveways (number)						0		
Minor industrial / institutional driveways (number)						0		
Major residential driveways (number)						1		
Minor residential driveways (number)						0		
Other driveways (number)						1		
Speed Category						Posted Speed Greater than 30 mph		
Roadside fixed object density (fixed objects / mi)				0		0		
Offset to roadside fixed objects (ft) [If greater than 30 or Not Pr	esent, input 30]	•	•	30		30		
Calibration Factor, Cr		•		1.00		1.00		

Worksheet 1B Crash Modification Factors for Urban and Suburban Roadway Segments									
(1)	(2) (3) (4) (5)								
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF				
CMF 1r	CMF 2r	CMF 3r	CMF 4r	CMF 5r	CMF comb				
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)				
1.00	1.00	1.00	0.91	1.00	0.91				

	Worksheet 1C Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments										
(1)	(1) (2)		(1) (2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
			Parameter, k	Initial N _{brmv}	Crashes	N _{brmv}	CMFs	Factor, Cr	N _{brmv}		
	from Table 12-3		from Table 12-3	from Equation 12-10		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)		
	а	b	Hom rable 12-3	IIOIII Equation 12-10		(4)TOTAL (3)	Worksheet 1B		(0) (1) (0)		
Total	-12.34	1.36	1.32	0.359	1.000	0.359	0.91	1.00	0.328		
Fatal and Injury (FI)	-12.76	1.28	1.31	0.111	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.105	0.91	1.00	0.096		
Fatai and injury (FI)	-12.70	1.20	1.31	0.111	0.292	0.105	0.91	1.00	0.090		
Property Demoge Only (PDO)	-12.81	1.38	1 24	0.271	(5) _{TOTAL} -(5) _{FI}	0.254	0.01	1.00	0.232		
Property Damage Only (PDO)	-12.81	1.38	1.34	0.271	0.708	0.254	0.91	1.00	0.232		

Worksho	eet 1D Multiple-Vehicle No	ndriveway Collisions by	Collision Type for Urban an	d Suburban Roadway Se	egments
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N brmv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N _{brmv} (PDO) (crashes/year)	Predicted N _{brmv (TOTAL)} (crashes/year)
	from Table 12-4	(9) _{FI} from Worksheet 1C	from Table 12-4	(9)PDO from Worksheet 1C	(9)TOTAL from Worksheet 1C
Total	1.000	0.096	1.000	0.232	0.328
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.832	0.080	0.662	0.154	0.233
Head-on collision	0.020	0.002	0.007	0.002	0.004
Angle collision	0.040	0.004	0.036	0.008	0.012
Sideswipe, same direction	0.050	0.005	0.223	0.052	0.057
Sideswipe, opposite direction	0.010	0.001	0.001	0.000	0.001
Other multiple-vehicle collision	0.048	0.005	0.071	0.016	0.021

	Worksheet 1E Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments										
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
Crash Severity Level			Parameter, k	Initial N _{brsv}	Crashes	N_{brsv}	CMFs	Factor, Cr	N_{brsv}		
Clash Seventy Level	from Ta	ble 12-5	from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)		
	а	b	Holli Table 12-3	Holli Equation 12-13		(T)TOTAL (S)	Worksheet 1B				
Total	-5.05	0.47	0.86	0.126	1.000	0.126	0.91	1.00	0.115		
Fatal and Injury (FI)	-8.71	0.66	0.28	0.019	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.019	0.91	1.00	0.018		
i atai and injury (i i)	-0.71	0.00	0.20	0.019	0.154	0.019	0.91	1.00	0.010		
Dranarti Damara Onli (DDO)	F 04	0.45	1.06	0.405	(5) _{TOTAL} -(5) _{FI}	0.406	0.04	4.00	0.007		
Property Damage Only (PDO)	-5.04	0.45	1.06	0.105	0.846	0.106	0.91	1.00	0.097		

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(F1)	Predicted N brsv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	'	
,	from Table 12-6	(9) _{FI} from Worksheet 1E	from Table 12-6	(9)PDO from Worksheet 1E	(9)TOTAL from Worksheet 1E
Total	1.000	0.018	1.000	0.097	0.115
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.001	0.000	0.063	0.006	0.006
Collision with fixed object	0.500	0.009	0.813	0.079	0.088
Collision with other object	0.028	0.000	0.016	0.002	0.002
Other single-vehicle collision	0.471	0.008	0.108	0.010	0.019

Work	sheet 1G Multiple-Vehicle Drive	way-Related Collisions by	y Driveway Type for Urban	and Suburban Roadway Segments	
(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	Number of driveways,	Crashes per driveway per year, N _j	Coefficient for traffic adjustment, t	Initial N _{brdwy}	Overdispersion parameter, k
	n _j	from Table 12-7	from Table 12-7	Equation 12-16	from Table 12-7
		HOIH TABLE 12-7	HOIII Table 12-7	n _j * N _j * (AADT/15,000) ^t	IIOIII Table 12-7
Major commercial	0	0.033	1.106	0.000	
Minor commercial	0	0.011	1.106	0.000	
Major industrial/institutional	0	0.036	1.106	0.000	
Minor industrial/institutional	0	0.005	1.106	0.000	
Major residential	1	0.018	1.106	0.014	
Minor residential	0	0.003	1.106	0.000	
Other	1	0.005	1.106	0.004	
Total				0.018	1.39

Worksheet 1H Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)	(7)			
Crash Severity Level	Initial N _{brdwy}		Adjusted N _{brdwy}	Combined CMFs	Calibration factor, C,	Predicted N _{brdwy}			
Crash Severity Level	(5) _{TOTAL} from Worksheet 1G	from Table 12-7	(2) _{TOTAL} * (3)	(6) from Worksheet 1B	, ·	(4)*(5)*(6)			
Total	0.018	1.000	0.018	0.91	1.00	0.016			
Fatal and injury (FI)		0.284	0.005	0.91	1.00	0.005			
Property damage only (PDO)		0.716	0.013	0.91	1.00	0.011			

	Worksheet 1I Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)	(8)*				
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{pedr}	Predicted N _{pedr}				
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8	(5)*(6)				
Total	0.328	0.115	0.016	0.459	0.019	0.009				
Fatal and injury (FI)						0.009				

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-19

	Worksheet 1J Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(8)*			
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{biker}	Predicted N _{biker}			
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9	(5)*(6)			
Total	0.328	0.115	0.016	0.459	0.005	0.002			
Fatal and injury (FI)						0.002			

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-20

Workshee	et 1K Crash Severity Distribution for Urban a	ind Suburban Roadway Segments	
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Callinian type	(3) from Worksheet 1D and 1F;	(5) from Worksheet 1D and 1F; and	(6) from Worksheet 1D and 1F;
Collision type	(7) from Worksheet 1H; and	(7) from Worksheet 1H	(7) from Worksheet 1H; and
	(8) from Worksheet 1I and 1J		(8) from Worksheet 1I and 1J
	MULTIPLE-VEHICLE	·	
Rear-end collisions (from Worksheet 1D)	0.080	0.154	0.233
Head-on collisions (from Worksheet 1D)	0.002	0.002	0.004
Angle collisions (from Worksheet 1D)	0.004	0.008	0.012
Sideswipe, same direction (from Worksheet 1D)	0.005	0.052	0.057
Sideswipe, opposite direction (from Worksheet 1D)	0.001	0.000	0.001
Driveway-related collisions (from Worksheet 1H)	0.005	0.011	0.016
Other multiple-vehicle collision (from Worksheet 1D)	0.005	0.016	0.021
Subtotal	0.100	0.244	0.344
	SINGLE-VEHICLE	·	
Collision with animal (from Worksheet 1F)	0.000	0.006	0.006
Collision with fixed object (from Worksheet 1F)	0.009	0.079	0.088
Collision with other object (from Worksheet 1F)	0.000	0.002	0.002
Other single-vehicle collision (from Worksheet 1F)	0.008	0.010	0.019
Collision with pedestrian (from Worksheet 1I)	0.009	0.000	0.009
Collision with bicycle (from Worksheet 1J)	0.002	0.000	0.002
Subtotal	0.029	0.097	0.126
- Fotal	0.129	0.341	0.470

Worksheet 1L Summary Results for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)					
Crash Severity Level	Predicted average crash frequency, N predicted rs (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)					
	(Total) from Worksheet 1K		(2) / (3)					
Total	0.5	0.24	2.0					
Fatal and injury (FI)	0.1	0.24	0.5					
Property damage only (PDO)	0.3	0.24	1.4					

Gen	eral Information		Location Information		
Analyst Agency or Company Date Performed	TL ATCS 02/17/21	Roadway Intersection Jurisdiction Analysis Year	Omega Dr/Fields Rd At I-270 SB Off-Ramp Montgomery County 2045		
	Input Data	Base Conditions	Site Conditions		
Intersection type (3ST, 3SG, 4ST, 4SG)	mput butu		3ST		
AADT _{major} (veh/day)	$AADT_{MAX} = 45,700 (veh/day)$		11,723		
AADT minor (veh/day)	$AADT_{MAX} = 9,300 (veh/day)$		3,039		
Intersection lighting (present/not present)	•	Not Present	Present		
Calibration factor, C _i		1.00	1.00		
Data for unsignalized intersections only:					
Number of major-road approaches with	n left-turn lanes (0,1,2)	0	0		
Number of major-road approaches with	n right-turn lanes (0,1,2)	0	0		
Data for signalized intersections only:	· ,				
		0			
Number of approaches with right-turn I	anes (0,1,2,3,4) [for 3SG, use maximum value of 3]	0			
Number of approaches with left-turn sign	gnal phasing [for 3SG, use maximum value of 3]				
Type of left-turn signal phasing for Leg		Permissive			
Type of left-turn signal phasing for Leg					
Type of left-turn signal phasing for Leg	#3				
Type of left-turn signal phasing for Leg					
11 0	on-red prohibited [for 3SG, use maximum value of 3]	0			
Intersection red light cameras (present	/not present)	Not Present			
	s (PedVol) Signalized intersections only				
Maximum number of lanes crossed by	,				
Number of bus stops within 300 m (1,0		0			
Schools within 300 m (1,000 ft) of the i	\1 /	Not Present			
Number of alcohol sales establishment	ts within 300 m (1,000 ft) of the intersection	0			

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(6)	(7)				
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF				
	Phasing									
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}				
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)				
1.00	1.00	1.00	1.00	0.91	1.00	0.91				

		Worksheet	2C Multiple-	Vehicle Collisions by Seve	rity Level for Urban	and Suburban Arterial II	ntersections									
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)							
Crash Severity Level	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted							
-				Parameter, k	Initial N _{bimv}	Crashes	N _{bimv}	CMFs	Factor, C _i	N_{bimv}						
	fr	om Table 12-1	0	from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5) (7) from		(6)*(7)*(8)							
	а	b	С	IIOIII Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)						
Total	-13.36	1.11	0.41	0.80	1.388	1.000	1.388	0.91	1.00	1.265						
Fotal and Injuny (FI)	-14.01 1.16	44.04	11.01	14.01	44.04	4404	01 1.16	44.04	0.30	0.69	0.479	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.464	0.91	1.00	0.423
Fatal and Injury (FI)	-14.01	1.10	0.30	0.69	0.479	0.334	0.464	0.91	1.00	0.423						
Property Damage Only	45.00	4.00	0.54	0.77	0.054	(5) _{TOTAL} -(5) _{FI}	0.004	0.04	4.00	0.040						
(PDO)	-15.38	1.20	0.51	0.77	0.954	0.666	0.924	0.91	1.00	0.842						

	Worksheet 2D Multiple-	Vehicle Collisions by Collis	sion Type for Urban and Suburb	an Arterial Intersections		
(1)	(2)	(3)	(4)	(5)	(6)	
Collision Type	Proportion of Collision Type(FI)	Predicted N bimv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv (TOTAL)} (crashes/year)	
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C	
Total	1.000	0.423	1.000	0.842	1.265	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Rear-end collision	0.421	0.178	0.440	0.371	0.549	
Head-on collision	0.045	0.019	0.023	0.019	0.038	
Angle collision	0.343	0.145	0.262	0.221	0.366	
Sideswipe	0.126	0.053	0.040	0.034	0.087	
Other multiple-vehicle collision	0.065	0.027	0.235	0.198	0.225	

		Worksheet	2E Single-V	ehicle Collisions by Severi	ty Level for Urban a	and Suburban Arterial In	ersections			
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
				Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N _{bisv}
Crash Severity Level	fr	om Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from		(C)*/7*/9\
	2	b	С	from Table 12-12	(FI) from Eqn. 12-		(T)TOTAL (S)	Worksheet 2B		(6)*(7)*(8)
	а	b	C		24 or 12-27					
Total	-6.81	0.16	0.51	1.14	0.295	1.000	0.295	0.91	1.00	0.269
Fatal and Injury (FI)					0.091	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.092	0.91	1.00	0.084
Fatal and injury (FI)					0.091	0.313	0.092	0.91	1.00	0.004
Property Damage Only	-8.36	0.05	0.55	1.20	0.200	(5) _{TOTAL} -(5) _{FI}	0.202	0.04	4.00	0.405
(PDO)	-8.36	0.25	0.55	1.29	0.200	0.687	0.203	0.91	1.00	0.185

	Worksheet 2F Single-V	ehicle Collisions by Collis	ion Type for Urban and Suburba	n Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bisv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv} (TOTAL) (crashes/year)
	from Table 12-13	(9)FI from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.084	1.000	0.185	0.269
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.003	0.001	0.001
Collision with animal	0.003	0.000	0.018	0.003	0.004
Collision with fixed object	0.762	0.064	0.834	0.154	0.218
Collision with other object	0.090	0.008	0.092	0.017	0.025
Other single-vehicle collision	0.039	0.003	0.023	0.004	0.008
Single-vehicle noncollision	0.105	0.009	0.030	0.006	0.014

Worksheet	Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(2)	(3)	(4)	(5)	(7)*					
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}					
Crash Seventy Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)					
Total	1.265	0.269	1.534	0.021	0.032					
Fatal and injury (FI)		-		-	0.032					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections								
(1)	(2) (3)								
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF						
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CiviF						
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)						
									

	Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections											
(1)	(2)					(3)	(4)	(5)	(6)	(7)		
SPF Coefficients Crash Severity Level				Overdispersion	$N_{pedbase}$	Combined CMF	Calibration	Predicted N _{pedi}				
Clash Severity Level		from Table 12-14					from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)		
	а	b	С	d	е		Hom Equation 12 25	(4) HOIT WORKSHEET ZIT		(4) (0) (0)		
Total		-							1.00			
Fatal and Injury (FI)		1							1.00			

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(7)*				
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}				
Clash Severity Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)				
Total	1.265	0.269	1.534	0.016	0.025				
Fatal and injury (FI)		-			0.025				

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

(1)	(2)	(3)	(4)
· · · · · · · · · · · · · · · · · · ·	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE		• •
Rear-end collisions (from Worksheet 2D)	0.178	0.371	0.549
Head-on collisions (from Worksheet 2D)	0.019	0.019	0.038
Angle collisions (from Worksheet 2D)	0.145	0.221	0.366
Sideswipe (from Worksheet 2D)	0.053	0.034	0.087
Other multiple-vehicle collision (from Worksheet 2D)	0.027	0.198	0.225
Subtotal	0.423	0.842	1.265
	SINGLE-VEHICLE		
Collision with parked vehicle (from Worksheet 2F)	0.000	0.001	0.001
Collision with animal (from Worksheet 2F)	0.000	0.003	0.004
Collision with fixed object (from Worksheet 2F)	0.064	0.154	0.218
Collision with other object (from Worksheet 2F)	0.008	0.017	0.025
Other single-vehicle collision (from Worksheet 2F)	0.003	0.004	0.008
Single-vehicle noncollision (from Worksheet 2F)	0.009	0.006	0.014
Collision with pedestrian (from Worksheet 2G or 2I)	0.032	0.000	0.032
Collision with bicycle (from Worksheet 2J)	0.025	0.000	0.025
Subtotal	0.141	0.185	0.326
Fotal State of the state of the	0.564	1.027	1.591

Worksheet 2L Summary Resul	ts for Urban and Suburban Arterial Intersections
(1)	(2)
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)
	(Total) from Worksheet 2K
Total	1.6
Fatal and injury (FI)	0.6
Property damage only (PDO)	1.0

	heet 2A General Information and Input	Data for Urban and Suburban Ar	rterial Intersections
General Informa	tion		Location Information
Analyst	PK	Roadway	W. Gude Drive
Agency or Company	ATCS	Intersection	W. Gude Drive at Research Boulevard
Date Performed	06/15/20	Jurisdiction	Montgomery County
		Analysis Year	2045
Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)			4SG
AADT _{major} (veh/day)	$AADT_{MAX} = 67,700$ (veh/day)		26,281
AADT minor (veh/day)	$AADT_{MAX} = 33,400$ (veh/day)		11,992
Intersection lighting (present/not present)	-	Not Present	Present
Calibration factor, C _i		1.00	1.00
Data for unsignalized intersections only:			
Number of major-road approaches with left-turn lan	es (0,1,2)	0	
Number of major-road approaches with right-turn la	nes (0,1,2)	0	
Data for signalized intersections only:			
Number of approaches with left-turn lanes (0,1,2,3,4	4) [for 3SG, use maximum value of 3]	0	4
Number of approaches with right-turn lanes (0,1,2,3	,4) [for 3SG, use maximum value of 3]	0	3
Number of approaches with left-turn signal phasing	[for 3SG, use maximum value of 3]		3
Type of left-turn signal phasing for Leg #1		Permissive	Protected
Type of left-turn signal phasing for Leg #2			Permissive / Protected
Type of left-turn signal phasing for Leg #3			Permissive / Protected
Type of left-turn signal phasing for Leg #4 (if application)	able)		Permissive
Number of approaches with right-turn-on-red prohib	ited [for 3SG, use maximum value of 3]	0	0
Intersection red light cameras (present/not present)	·	Not Present	Not Present
Sum of all pedestrian crossing volumes (PedVol)			129
Maximum number of lanes crossed by a pedestrian	(lanesk)		7
Number of bus stops within 300 m (1,000 ft) of the i		0	4
Schools within 300 m (1,000 ft) of the intersection (Not Present	Not Present
Number of alcohol sales establishments within 300	m (1,000 ft) of the intersection	0	0

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections										
(1)	(2)	(3)	(4)	(5)	(6)	(7)					
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF					
	Phasing										
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}					
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)					
0.66	0.92	0.88	1.00	0.91	1.00	0.49					

		Worksheet	2C Multiple-	Vehicle Collisions by Sever	rity Level for Urban	and Suburban Arterial I	ntersections					
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)			
Crash Severity Level	S	PF Coefficien	ts	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
-				Parameter, k	Initial N _{bimv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bimv}		
	fr	om Table 12-1	0	from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from	1	(6)*(7)*(8)		
	а	b	С	Holli Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)		
Total	-10.99	1.07	0.23	0.39	7.839	1.000	7.839	0.49	1.00	3.841		
Fotal and Injuny (FI)	-13.14	1.18	0.22	0.33	2.546	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	2.637	0.49	1.00	1.292		
Fatal and Injury (FI)	-13.14	1.10	0.22	0.33	0.33	0.33	2.540	0.336	2.037	0.49	1.00	1.292
Property Damage Only	44.00	4.00	0.04	0.44	5.004	(5) _{TOTAL} -(5) _{FI}	5.000	0.40	4.00	0.540		
(PDO)	-11.02	1.02	0.24	0.44	5.024	0.664	5.202	0.49	1.00	2.549		

	Worksheet 2D Multiple-	Vehicle Collisions by Collis	sion Type for Urban and Suburb	an Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N bimv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv (TOTAL)} (crashes/year)
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C
Total	1.000	1.292	1.000	2.549	3.841
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.450	0.581	0.483	1.231	1.812
Head-on collision	0.049	0.063	0.030	0.076	0.140
Angle collision	0.347	0.448	0.244	0.622	1.070
Sideswipe	0.099	0.128	0.032	0.082	0.209
Other multiple-vehicle collision	0.055	0.071	0.211	0.538	0.609

		Worksheet	2E Single-V	ehicle Collisions by Severi	ty Level for Urban a	and Suburban Arterial In	tersections				
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
	SPF Coefficients		SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
		Parameter, k		Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, Ci	N_{bisv}		
Crash Severity Level	fr	om Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from	Ī	(6)*(7)*(8)	
	а	b	С	from Table 12-12 (F	(FI) from Eqn. 12-		(T)TOTAL (S)	Worksheet 2B		(0) (1) (0)	
	а	b	C		24 or 12-27						
Total	-10.21	0.68	0.27	0.36	0.470	1.000	0.470	0.49	1.00	0.230	
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.116	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.118	0.49	1.00	0.058	
Fatal and injury (FI)	-9.25	0.43	0.29	0.09	0.110	0.250	0.116	0.49	1.00	0.038	
Property Damage Only	-11.34	0.78	0.25	0.44	0.348	(5) _{TOTAL} -(5) _{FI}	0.353	0.49	4.00	0.173	
(PDO)	-11.34	0.78	0.25	0.44	0.348	0.750	0.353	0.49	1.00	0.173	

	Worksheet 2F Single-V	ehicle Collisions by Collis	ion Type for Urban and Suburba	n Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bisv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv} (TOTAL) (crashes/year)
	from Table 12-13	(9)FI from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.058	1.000	0.173	0.230
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.000	0.000
Collision with fixed object	0.744	0.043	0.870	0.150	0.193
Collision with other object	0.072	0.004	0.070	0.012	0.016
Other single-vehicle collision	0.040	0.002	0.023	0.004	0.006
Single-vehicle noncollision	0.141	0.008	0.034	0.006	0.014

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(1) (2) (3) (4) (5)								
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}				
Clash Severity Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total									
Fatal and injury (FI)				-					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections									
(1)	(1) (2) (3) (4)									
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF							
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CiviF							
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)							
4.15	1.00	1.00	4.15							

Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections										
(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	SPF Coefficients			Overdispersion	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}		
Crash Severity Level		from Table 12-14				Parameter, k	from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)
	а	b	С	d	е		IIOIII Equation 12-29	(4) HOIH WORKSHEEL ZIT		(4) (3) (0)
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.048	4.15	1.00	0.197
Fatal and Injury (FI)									1.00	0.197

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections								
(1)	(2)	(2) (3) (4) (5)						
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}			
Crash Severity Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)			
Total	3.841	0.230	4.071	0.015	0.061			
Fatal and injury (FI)				-	0.061			

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksr	neet 2K Crash Severity Distribution for Urban a	nd Suburban Arterial Intersections	
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE	·	• • •
Rear-end collisions (from Worksheet 2D)	0.581	1.231	1.812
Head-on collisions (from Worksheet 2D)	0.063	0.076	0.140
Angle collisions (from Worksheet 2D)	0.448	0.622	1.070
Sideswipe (from Worksheet 2D)	0.128	0.082	0.209
Other multiple-vehicle collision (from Worksheet 2D)	0.071	0.538	0.609
Subtotal	1.292	2.549	3.841
	SINGLE-VEHICLE		•
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 2F)	0.043	0.150	0.193
Collision with other object (from Worksheet 2F)	0.004	0.012	0.016
Other single-vehicle collision (from Worksheet 2F)	0.002	0.004	0.006
Single-vehicle noncollision (from Worksheet 2F)	0.008	0.006	0.014
Collision with pedestrian (from Worksheet 2G or 2I)	0.197	0.000	0.197
Collision with bicycle (from Worksheet 2J)	0.061	0.000	0.061
Subtotal	0.316	0.173	0.489
Total	1.608	2.722	4.329

Worksheet 2L Summary Results for Urban and Suburban Arterial Intersections							
(1)	(2)						
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)						
	(Total) from Worksheet 2K						
Total	4.3						
Fatal and injury (FI)	1.6						
Property damage only (PDO)	2.7						

Worksheet	1A General In	formation	and Input D	ata for Urban and Suburba	n Roadway	Segments		
General Information			-			Location Information		
Analyst		PK		Roadway		W. Gude Drive		
Agency or Company		ATCS		Roadway Section		250 ft east of Research Blvd to 250 ft west of Piccard Dr		
Date Performed		06/15/20		Jurisdiction		Montgomery County		
				Analysis Year		2045		
Input Data				Base Conditions		Site Conditions		
Roadway type (2U, 3T, 4U, 4D, ST)						4D		
Length of segment, L (mi)						0.19		
AADT (veh/day)	$AADT_{MAX} =$	66,000	(veh/day)			26,589		
Type of on-street parking (none/parallel/angle)				None	None			
Proportion of curb length with on-street parking								
Median width (ft) - for divided only				15		10		
Lighting (present / not present)				Not Present		Present		
Auto speed enforcement (present / not present)				Not Present		Not Present		
Major commercial driveways (number)						0		
Minor commercial driveways (number)						0		
Major industrial / institutional driveways (number)						0		
Minor industrial / institutional driveways (number)						0		
Major residential driveways (number)						0		
Minor residential driveways (number)						0		
Other driveways (number)					0			
Speed Category						Posted Speed Greater than 30 mph		
Roadside fixed object density (fixed objects / mi)				0		31.57894737		
Offset to roadside fixed objects (ft) [If greater than 30 or Not Pr	esent, input 30]			30		6		
Calibration Factor, Cr				1.00		1.00		

Worksheet 1B Crash Modification Factors for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)				
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF				
CMF 1r	CMF 2r	CMF 3r	CMF 4r	CMF 5r	CMF comb				
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)				
1.00	1.10	1.01	0.91	1.00	1.01				

	Worksheet 1C Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments										
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Crash Severity Level	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
			Parameter, k	Initial N _{brmv}	Crashes	N_{brmv}	CMFs	Factor, Cr	N _{brmv}		
	from Ta	ble 12-3	from Table 12-3	from Equation 12-10		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)		
	а	b	Hom rable 12-3	IIOIII Equation 12-10		(4)TOTAL (3)	Worksheet 1B		(0) (1) (0)		
Total	-12.34	1.36	1.32	0.865	1.000	0.865	1.01	1.00	0.878		
Fatal and Injury (FI)	-12.76	1.28	1.31	0.252	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.238	1.01	1.00	0.241		
ratai and injury (FI)	-12.70	1.20	1.31	0.232	0.275	0.236	1.01	1.00	0.241		
Property Democra Only (PDO)	40.04	4.20	4.24	0.000	(5) _{TOTAL} -(5) _{FI}	0.607	1.01	1.00	0.636		
Property Damage Only (PDO)	-12.81	1.38	1.34	0.663	0.725	0.627	1.01	1.00	0.636		

Wor	rksheet 1D Multiple-Vehicle No	ndriveway Collisions by	Collision Type for Urban an	d Suburban Roadway Se	egments
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N brmv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N brmv (PDO) (crashes/year)	Predicted N _{brmv (TOTAL)} (crashes/year)
	from Table 12-4	(9)FI from Worksheet 1C	from Table 12-4	(9)PDO from Worksheet 1C	(9)TOTAL from Worksheet 1C
Total	1.000	0.241	1.000	0.636	0.878
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.832	0.201	0.662	0.421	0.622
Head-on collision	0.020	0.005	0.007	0.004	0.009
Angle collision	0.040	0.010	0.036	0.023	0.033
Sideswipe, same direction	0.050	0.012	0.223	0.142	0.154
Sideswipe, opposite direction	0.010	0.002	0.001	0.001	0.003
Other multiple-vehicle collision	0.048	0.012	0.071	0.045	0.057

	Worksheet 1E Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments												
(1)	(2)		(2)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted				
Crash Severity Level			Parameter, k	Initial N _{brsv}	Crashes	N _{brsv}	CMFs	Factor, Cr	N _{brsv}				
Clasii Severity Lever	from Ta	ble 12-5	from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)				
	а	b	HOIII TABIC 12-0	Hom Equation 12-13		(+)TOTAL (0)	Worksheet 1B		(0) (1) (0)				
Total	-5.05	0.47	0.86	0.146	1.000	0.146	1.01	1.00	0.148				
Fatal and Injury (FI)	-8.71	0.66	0.28	0.026	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.026	1.01	1.00	0.026				
ratarana mjary (r i)	-0.71	0.00	0.20	0.020	0.178	0.020	1.01	1.00	0.020				
Property Damage Only (PDO)	-5.04	0.45	1.06	0.121	(5) _{TOTAL} -(5) _{FI}	0.120	1.01	1.00	0.122				
Froperty Damage Only (PDO)	-5.04	0.45	1.00	0.121	0.822	0.120	1.01	1.00	0.122				

(1)	(2)	(3)	(4)	(5)	(6)	
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{brsv} (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N brsv (PDO) (crashes/year)	Predicted N _{brsv (TOTAL)} (crashes/year)	
	from Table 12-6	(9)FI from Worksheet 1E	from Table 12-6	(9)PDO from Worksheet 1E	(9)TOTAL from Worksheet 1E	
Total	1.000	0.026	1.000	0.122	0.148	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Collision with animal	0.001	0.000	0.063	0.008	0.008	
Collision with fixed object	0.500	0.013	0.813	0.099	0.112	
Collision with other object	0.028	0.001	0.016	0.002	0.003	
Other single-vehicle collision	0.471	0.012	0.108	0.013	0.026	

Work	sheet 1G Multiple-Vehicle Drive	way-Related Collisions by	y Driveway Type for Urban	and Suburban Roadway Segments	
(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	Number of driveways,	Crashes per driveway per year, N _j	Coefficient for traffic adjustment, t	Initial N _{brdwy}	Overdispersion parameter, k
Driveway Type	n _i	from Table 12-7	from Table 12-7	Equation 12-16	from Table 12-7
	•	ITOTTI TADIE 12-7	ITOTTI TABLE 12-7	n _j * N _j * (AADT/15,000) ^t	IIOIII Table 12-7
Major commercial	0	0.033	1.106	0.000	
Minor commercial	0	0.011	1.106	0.000	
Major industrial/institutional	0	0.036	1.106	0.000	
Minor industrial/institutional	0	0.005	1.106	0.000	
Major residential	0	0.018	1.106	0.000	
Minor residential	0	0.003	1.106	0.000	
Other	0	0.005	1.106	0.000	
Total				0.000	1.39

Worksheet 1H Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments									
(1)	(2) (3) (4) (5) (6)					(7)			
Crash Severity Level	Initial N _{brdwy}	Proportion of total crashes (f _{dwy})	Adjusted N _{brdwy}	Combined CMFs	Calibration factor, C,	Predicted N _{brdwy}			
Crash Severity Level	(5) _{TOTAL} from Worksheet 1G	from Table 12-7	(2) _{TOTAL} * (3)	(6) from Worksheet 1B	, ,	(4)*(5)*(6)			
Total	0.000	1.000	0.000	1.01	1.00	0.000			
Fatal and injury (FI)		0.284	0.000	1.01	1.00	0.000			
Property damage only (PDO)		0.716	0.000	1.01	1.00	0.000			

	Worksheet 1I Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)	(8)*				
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{pedr}	Predicted N _{pedr}				
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8	(5)*(6)				
Total	0.878	0.148	0.000	1.026	0.019	0.019				
atal and injury (FI)						0.019				

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-19

	Worksheet 1J Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)	(8)*				
Crash Severity Level	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{biker}	Predicted N _{biker}				
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9	(5)*(6)				
Total	0.878	0.148	0.000	1.026	0.005	0.005				
Fatal and injury (FI)						0.005				

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-20

(1)	et 1K Crash Severity Distribution for Urban a	(3)	(4)
(')	Fatal and injury (FI)	Property damage only (PDO)	Total
.	(3) from Worksheet 1D and 1F;	(5) from Worksheet 1D and 1F; and	(6) from Worksheet 1D and 1F;
Collision type	(7) from Worksheet 1H; and	(7) from Worksheet 1H	(7) from Worksheet 1H; and
	(8) from Worksheet 1I and 1J		(8) from Worksheet 1I and 1J
	MULTIPLE-VEHICLE	•	
Rear-end collisions (from Worksheet 1D)	0.201	0.421	0.622
Head-on collisions (from Worksheet 1D)	0.005	0.004	0.009
Angle collisions (from Worksheet 1D)	0.010	0.023	0.033
Sideswipe, same direction (from Worksheet 1D)	0.012	0.142	0.154
Sideswipe, opposite direction (from Worksheet 1D)	0.002	0.001	0.003
Oriveway-related collisions (from Worksheet 1H)	0.000	0.000	0.000
Other multiple-vehicle collision (from Worksheet 1D)	0.012	0.045	0.057
Subtotal	0.241	0.636	0.878
	SINGLE-VEHICLE		
Collision with animal (from Worksheet 1F)	0.000	0.008	0.008
Collision with fixed object (from Worksheet 1F)	0.013	0.099	0.112
Collision with other object (from Worksheet 1F)	0.001	0.002	0.003
Other single-vehicle collision (from Worksheet 1F)	0.012	0.013	0.026
Collision with pedestrian (from Worksheet 1I)	0.019	0.000	0.019
Collision with bicycle (from Worksheet 1J)	0.005	0.000	0.005
Subtotal	0.051	0.122	0.173
- Total	0.292	0.758	1.051

Worksheet 1L Summary Results for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)						
Crash Severity Level	Predicted average crash frequency, N $_{\rm predicted\ rs}$ (crashes/year)	Roadway segment length, L (mi)							
	(Total) from Worksheet 1K		(2) / (3)						
Total	1.1	0.19	5.5						
Fatal and injury (FI)	0.3	0.19	1.5						
Property damage only (PDO)	0.8	0.19	4.0						

Como	Worksheet 2A General Information and Input ral Information	Data 10. Orban and Guburban Arte			
			Location Information		
Analyst	PK	Roadway	W. Gude Drive		
Agency or Company	ATCS	Intersection	W. Gude Drive at Piccard Drive		
Date Performed	06/08/20	Jurisdiction	Montgomery County		
	18.1	Analysis Year	2045		
Intersection type (3ST, 3SG, 4ST, 4SG)	nput Data	Base Conditions	Site Conditions 3SG		
,	$AADT_{MAX} = 58,100 (veh/day)$		26,297		
AADT major (veh/day)			· · · · · · · · · · · · · · · · · · ·		
AADT _{minor} (veh/day)	$AADT_{MAX} = 16,400 (veh/day)$	-	6,313		
Intersection lighting (present/not present)		Not Present	Present		
Calibration factor, C _i		1.00	1.00		
Data for unsignalized intersections only:					
Number of major-road approaches with	eft-turn lanes (0,1,2)	0			
Number of major-road approaches with	right-turn lanes (0,1,2)	0			
Data for signalized intersections only:					
Number of approaches with left-turn lane	es (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	2		
Number of approaches with right-turn la	nes (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	2		
Number of approaches with left-turn sign	nal phasing [for 3SG, use maximum value of 3]		2		
Type of left-turn signal phasing for Leg #	1	Permissive	Permissive / Protected		
Type of left-turn signal phasing for Leg #	22		Not Applicable		
Type of left-turn signal phasing for Leg #	3		Protected		
Type of left-turn signal phasing for Leg #	4 (if applicable)		Not Applicable		
Number of approaches with right-turn-or	-red prohibited [for 3SG, use maximum value of 3]	0	0		
Intersection red light cameras (present/r		Not Present	Not Present		
Sum of all pedestrian crossing volumes	(PedVol) Signalized intersections only		231		
Maximum number of lanes crossed by a	pedestrian (n _{lanesx})		5		
Number of bus stops within 300 m (1,00	,	0	2		
Schools within 300 m (1,000 ft) of the int	\(\)	Not Present	Not Present		
Number of alcohol sales establishments	within 300 m (1,000 ft) of the intersection	0	0		

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(6)	(7)				
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF				
	Phasing									
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}				
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)				
0.86	0.98	0.92	1.00	0.91	1.00	0.71				

		Worksheet	2C Multiple-	Vehicle Collisions by Sever	rity Level for Urban	and Suburban Arterial I	ntersections			
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
Crash Severity Level	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
-				Parameter, k	Initial N _{bimv}	Crashes	N _{bimv}	CMFs	Factor, C _i	N_{bimv}
	fr	om Table 12-1	0	from Table 12-10 from Equation 12-		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)	
	а	b	С	IIOIII Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)
Total	-12.13	1.11	0.26	0.33	4.228	1.000	4.228	0.71	1.00	2.991
Fotal and Injury (FI)	-11.58	1.02	0.17	0.30	1.334	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	1.404	0.71	1.00	0.993
Fatal and Injury (FI)	-11.30	1.02	0.17	0.30	1.554	0.332	1.404	0.71	1.00	0.993
Property Damage Only	40.04	4.44	0.00	2.22	0.004	(5) _{TOTAL} -(5) _{FI}	0.004	0.74	4.00	4.000
(PDO)	-13.24	1.14	0.30	0.36	2.684	0.668	2.824	0.71	1.00	1.998

	Worksheet 2D Multiple-	Vehicle Collisions by Collis	sion Type for Urban and Suburb	an Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N bimv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv (TOTAL)} (crashes/year)
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C
Total	1.000	0.993	1.000	1.998	2.991
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.549	0.545	0.546	1.091	1.636
Head-on collision	0.038	0.038	0.020	0.040	0.078
Angle collision	0.280	0.278	0.204	0.408	0.686
Sideswipe	0.076	0.075	0.032	0.064	0.139
Other multiple-vehicle collision	0.057	0.057	0.198	0.396	0.452

		Worksheet	2E Single-V	ehicle Collisions by Severi	ty Level for Urban a	and Suburban Arterial In	tersections			
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
	S	SPF Coefficients Overdispersion Parameter, k		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
				Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}	
Crash Severity Level	fr	rom Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)
	а	b	С	from Table 12-12	(FI) from Eqn. 12-		(T)TOTAL (S)	Worksheet 2B		(0) (1) (0)
	а	D	C		24 or 12-27					
Total	-9.02	0.42	0.40	0.36	0.288	1.000	0.288	0.71	1.00	0.204
Fatal and Injury (FI)	-9.75	0.27	0.51	0.24	0.079	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.082	0.71	1.00	0.058
Fatal and injury (FI)	-9.75	0.27	0.51	0.24	0.079	0.284	0.002	0.71	1.00	0.038
Property Damage Only	0.00	0.45	0.22	0.53	0.400	(5) _{TOTAL} -(5) _{FI}	0.206	0.74	4.00	0.446
(PDO)	-9.08	0.45	0.33	0.53	0.199	0.716	0.206	0.71	1.00	0.146

	Worksheet 2F Single-V	ehicle Collisions by Collis	ion Type for Urban and Suburba	n Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bisv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv (TOTAL)} (crashes/year)
	from Table 12-13	(9)FI from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.058	1.000	0.146	0.204
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.001	0.000	0.003	0.000	0.000
Collision with fixed object	0.653	0.038	0.895	0.131	0.168
Collision with other object	0.091	0.005	0.069	0.010	0.015
Other single-vehicle collision	0.045	0.003	0.018	0.003	0.005
Single-vehicle noncollision	0.209	0.012	0.014	0.002	0.014

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(2)	(3)	(4)	(5)	(7)*				
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}				
Crash Seventy Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total									
Fatal and injury (FI)				-					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections								
(1)	(1) (2) (3) (4)								
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CME						
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CMF						
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)						
2.78	1.00	1.00	2.78						

Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections											
(1)	(2)					(3)	(4)	(5)	(6)	(7)	
Crash Severity Level		S	PF Coefficien	ts		Overdispersion	N _{pedbase}	Calibration	Predicted N _{pedi}		
Crash Severity Level		from Table 12-14					from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)	
	а	b	С	d	е		IIOIII Equation 12-23	(4) HOITI WORKSHEET ZIT		(4) (3) (0)	
Total	-6.60	0.05	0.24	0.41	0.09	0.52	0.024	2.78	1.00	0.066	
Fatal and Injury (FI)							1		1.00	0.066	

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(7)*				
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bisv} Predicted N _{bi}		Predicted N _{bikei}				
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)				
Total	2.991	0.204	3.195	0.011	0.035				
Fatal and injury (FI)		-	-	-	0.035				

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksh	eet 2K Crash Severity Distribution for Urban a	nd Suburban Arterial Intersections	
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE	·	
Rear-end collisions (from Worksheet 2D)	0.545	1.091	1.636
Head-on collisions (from Worksheet 2D)	0.038	0.040	0.078
Angle collisions (from Worksheet 2D)	0.278	0.408	0.686
Sideswipe (from Worksheet 2D)	0.075	0.064	0.139
Other multiple-vehicle collision (from Worksheet 2D)	0.057	0.396	0.452
Subtotal	0.993	1.998	2.991
	SINGLE-VEHICLE		•
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 2F)	0.038	0.131	0.168
Collision with other object (from Worksheet 2F)	0.005	0.010	0.015
Other single-vehicle collision (from Worksheet 2F)	0.003	0.003	0.005
Single-vehicle noncollision (from Worksheet 2F)	0.012	0.002	0.014
Collision with pedestrian (from Worksheet 2G or 2I)	0.066	0.000	0.066
Collision with bicycle (from Worksheet 2J)	0.035	0.000	0.035
Subtotal	0.159	0.146	0.305
Total	1.152	2.144	3.296

Worksheet 2L Summary Resul	Worksheet 2L Summary Results for Urban and Suburban Arterial Intersections							
(1)	(2)							
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)							
	(Total) from Worksheet 2K							
Total	3.3							
Fatal and injury (FI)	1.2							
Property damage only (PDO)	2.1							

	sheet 2A General Information and Inpu	Data for Urban and Suburban Ar	
General Inform	ation		Location Information
Analyst	PK	Roadway	Westlake Terrace
Agency or Company	ATCS	Intersection	At Motor City Drive
Date Performed	10/09/20	Jurisdiction	City of Rockville
		Analysis Year	2045
Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)			4SG
AADT _{major} (veh/day)	$AADT_{MAX} = 67,700 (veh/day)$		16,801
AADT _{minor} (veh/day)	$AADT_{MAX} = 33,400$ (veh/day)	-	4,897
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C _i		1.00	1.00
Data for unsignalized intersections only:			
Number of major-road approaches with left-turn la	nes (0,1,2)	0	0
Number of major-road approaches with right-turn I	anes (0,1,2)	0	0
Data for signalized intersections only:			
Number of approaches with left-turn lanes (0,1,2,3	,4) [for 3SG, use maximum value of 3]	0	4
Number of approaches with right-turn lanes (0,1,2,	3,4) [for 3SG, use maximum value of 3]	0	0
Number of approaches with left-turn signal phasing	g [for 3SG, use maximum value of 3]		1
Type of left-turn signal phasing for Leg #1		Permissive	Permissive
Type of left-turn signal phasing for Leg #2			Permissive / Protected
Type of left-turn signal phasing for Leg #3			Permissive
Type of left-turn signal phasing for Leg #4 (if applied	cable)		Permissive
Number of approaches with right-turn-on-red prohi	bited [for 3SG, use maximum value of 3]	0	0
Intersection red light cameras (present/not present		Not Present	Not Present
Sum of all pedestrian crossing volumes (PedVol)			54
Maximum number of lanes crossed by a pedestria	(idilosk)		5
Number of bus stops within 300 m (1,000 ft) of the		0	2
Schools within 300 m (1,000 ft) of the intersection		Not Present	Not Present
Number of alcohol sales establishments within 300	m (1,000 ft) of the intersection	0	0

Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections										
(1)	(2)	(3)	(4)	(5)	(6)	(7)				
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF				
	Phasing									
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}				
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)				
0.66	1.00	1.00	1.00	0.91	1.00	0.60				

		Worksheet	2C Multiple-	Vehicle Collisions by Sever	rity Level for Urban	and Suburban Arterial II	ntersections			
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
Crash Severity Level	S	PF Coefficien	ts	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
-				Parameter, k	Initial N _{bimv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bimv}
	fr	om Table 12-1	0	from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from	1	(6)*(7)*(8)
	а	b	С	Holli Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)
Total	-10.99	1.07	0.23	0.39	3.953	1.000	3.953	0.60	1.00	2.376
Fotal and Injuny (FI)	-13.14	1.18	0.22	0.33	1.233	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	1.283	0.60	1.00	0.771
Fatal and Injury (FI)	-13.14	1.10	0.22	0.33		0.324	1.203	0.60	1.00	0.771
Property Damage Only	44.00	4.00	0.04	0.44	0.507	(5) _{TOTAL} -(5) _{FI}	0.070	0.00	4.00	4.005
(PDO)	-11.02	1.02	0.24	0.44	2.567	0.676	2.670	0.60	1.00	1.605

	Worksheet 2D Multiple-	Vehicle Collisions by Collis	sion Type for Urban and Suburb	an Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type(FI)	Predicted N bimv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv (TOTAL)} (crashes/year)
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C
Total	1.000	0.771	1.000	1.605	2.376
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.450	0.347	0.483	0.775	1.122
Head-on collision	0.049	0.038	0.030	0.048	0.086
Angle collision	0.347	0.268	0.244	0.392	0.659
Sideswipe	0.099	0.076	0.032	0.051	0.128
Other multiple-vehicle collision	0.055	0.042	0.211	0.339	0.381

	Worksheet 2E Single-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections										
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
			Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}		
Crash Severity Level	from Table 12-12				from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)	
		a b c	from Table 12-12	(FI) from Eqn. 12-		(T)TOTAL (O)	Worksheet 2B		(0) (1) (0)		
	а	b	· ·	· ·	24 or 12-27						
Total	-10.21	0.68	0.27	0.36	0.272	1.000	0.272	0.60	1.00	0.164	
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.074	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.075	0.60	1.00	0.045	
ratai and injury (Fi)	-9.25	0.43	0.29	0.09	0.074	0.274	0.075	0.00	1.00	0.045	
Property Damage Only	44.04	0.70	0.05	0.44	0.400	(5) _{TOTAL} -(5) _{FI}	0.400	0.00	4.00	0.440	
(PDO)	-11.34	0.78	0.25	0.44	0.196	0.726	0.198	0.60	1.00	0.119	

	Worksheet 2F Single-V	ehicle Collisions by Collis	ion Type for Urban and Suburba	n Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bisv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv (TOTAL)} (crashes/year)
	from Table 12-13	(9) _{FI} from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.045	1.000	0.119	0.164
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.000	0.000
Collision with fixed object	0.744	0.033	0.870	0.103	0.137
Collision with other object	0.072	0.003	0.070	0.008	0.012
Other single-vehicle collision	0.040	0.002	0.023	0.003	0.005
Single-vehicle noncollision	0.141	0.006	0.034	0.004	0.010

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(2)	(3)	(4)	(5)	(7)*				
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}				
Clash Severity Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total									
Fatal and injury (FI)				-					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections									
(1)	(1) (2) (3) (4)									
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF							
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CiviF							
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)							
2.78	1.00	1.00	2.78							

	Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections													
(1)	(2)					(3)	(4)	(5)	(6)	(7)				
Crash Severity Level	SPF Coefficients			Overdispersion	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}						
Crash Seventy Level		from Table 12-14					from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)				
	а	b	С	d	е		Hom Equation 12 20	(4) HOIH WORKSHEET ZIT		(4) (0) (0)				
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.021	2.78	1.00	0.058				
Fatal and Injury (FI)									1.00	0.058				

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections									
(1)	(2)	(2) (3) (4)			(7)*				
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}				
Crash Seventy Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)				
Total	2.376	0.164	2.540	0.015	0.038				
atal and injury (FI)				1	0.038				

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksh	eet 2K Crash Severity Distribution for Urban a	nd Suburban Arterial Intersections	
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE		
Rear-end collisions (from Worksheet 2D)	0.347	0.775	1.122
Head-on collisions (from Worksheet 2D)	0.038	0.048	0.086
Angle collisions (from Worksheet 2D)	0.268	0.392	0.659
Sideswipe (from Worksheet 2D)	0.076	0.051	0.128
Other multiple-vehicle collision (from Worksheet 2D)	0.042	0.339	0.381
Subtotal	0.771	1.605	2.376
	SINGLE-VEHICLE		
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 2F)	0.033	0.103	0.137
Collision with other object (from Worksheet 2F)	0.003	0.008	0.012
Other single-vehicle collision (from Worksheet 2F)	0.002	0.003	0.005
Single-vehicle noncollision (from Worksheet 2F)	0.006	0.004	0.010
Collision with pedestrian (from Worksheet 2G or 2I)	0.058	0.000	0.058
Collision with bicycle (from Worksheet 2J)	0.038	0.000	0.038
Subtotal	0.141	0.119	0.260
Total	0.912	1.724	2.636

Worksheet 2L Summary Resu	Its for Urban and Suburban Arterial Intersections
(1)	(2)
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)
	(Total) from Worksheet 2K
Total	2.6
Fatal and injury (FI)	0.9
Property damage only (PDO)	1.7

		and input ש	ata for Urban and Suburbar		<u> </u>
General Information					Location Information
Analyst	PK		Roadway		Westlake Terrace
Agency or Company	ATCS		Roadway Section		Motor City Dr to I-270 Spur Ramps
Date Performed	10/09/20		Jurisdiction		City of Rockville
			Analysis Year		2045
Input Data			Base Conditions		Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)				4D	
Length of segment, L (mi)					0.03
AADT (veh/day)	$AADT_{MAX} = 66,000$	(veh/day)			16,876
Type of on-street parking (none/parallel/angle)			None		None
Proportion of curb length with on-street parking					0
Median width (ft) - for divided only			15		15
Lighting (present / not present)			Not Present		Present
Auto speed enforcement (present / not present)			Not Present		Not Present
Major commercial driveways (number)					0
Minor commercial driveways (number)					0
Major industrial / institutional driveways (number)					0
Minor industrial / institutional driveways (number)					0
Major residential driveways (number)					0
Minor residential driveways (number)					0
Other driveways (number)					0
Speed Category	·				Posted Speed 30 mph or Lower
Roadside fixed object density (fixed objects / mi)		•	0		67
Offset to roadside fixed objects (ft) [If greater than 30 or Not Pr	esent, input 30]		30		12
Calibration Factor, Cr			1.00		1.00

	Worksheet 1B Crash Modification Factors for Urban and Suburban Roadway Segments										
(1)	(2)	(3)	(4)	(5)	(6)						
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF						
CMF 1r	CMF 2r	CMF 3r	CMF 4r	CMF 5r	CMF comb						
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)						
1.00	1.15	1.00	0.91	1.00	1.05						

	Workshee	et 1C Multipl	e-Vehicle Nondriveway Co	ollisions by Severity Level	for Urban and Suburba		egments		
(1)	(1) (2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
•			Parameter, k	Initial N _{brmv}	Crashes	N _{brmv}	CMFs	Factor, Cr	N _{brmv}
	from Ta	ble 12-3	from Table 12-3	from Equation 12-10		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)
	а	b	Hom Table 12-3	Ironi Equation 12-10		(')TOTAL (")	Worksheet 1B		
Total	-12.34	1.36	1.32	0.074	1.000	0.074	1.05	1.00	0.077
Fatal and Injury (FI)	-12.76	1.28	1.31	0.022	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.021	1.05	1.00	0.022
Fatai and injury (Fi)	-12.70	1.20	1.51	0.022	0.284	0.021	1.03	1.00	0.022
Dronauti Damasa Only (DDO)	40.04	4.20	4.24	0.056	(5) _{TOTAL} -(5) _{FI}	0.052	1.05	1.00	0.055
Property Damage Only (PDO)	-12.81	1.38	1.34	0.056	0.716	0.053	1.05	1.00	0.055

Wor	ksheet 1D Multiple-Vehicle No	ndriveway Collisions by	Collision Type for Urban an	d Suburban Roadway Se	egments
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N brmv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N brmv (PDO) (crashes/year)	Predicted N _{brmv (TOTAL)} (crashes/year)
	from Table 12-4	(9)FI from Worksheet 1C	from Table 12-4	(9)PDO from Worksheet 1C	(9)TOTAL from Worksheet 1C
Total	1.000	0.022	1.000	0.055	0.077
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.832	0.018	0.662	0.037	0.055
Head-on collision	0.020	0.000	0.007	0.000	0.001
Angle collision	0.040	0.001	0.036	0.002	0.003
Sideswipe, same direction	0.050	0.001	0.223	0.012	0.013
Sideswipe, opposite direction	0.010	0.000	0.001	0.000	0.000
Other multiple-vehicle collision	0.048	0.001	0.071	0.004	0.005

	Worksheet 1E Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments										
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
Crash Severity Level			Parameter, k	Initial N _{brsv}	Crashes	N _{brsv}	CMFs	Factor, Cr	N _{brsv}		
Crash Seventy Level	I from Lable 17-5		from Table 12-5	from Equation 12-13	(4)		(6) from		(6)*(7)*(8)		
	а	b	Hom rable 12-3	Hom Equation 12-15		(4) _{TOTAL} *(5)	Worksheet 1B		(0) (1) (0)		
Total	-5.05	0.47	0.86	0.019	1.000	0.019	1.05	1.00	0.020		
Fatal and Injury (FI)	-8.71	0.66	0.28	0.003	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.003	1.05	1.00	0.003		
i atai and injury (i i)	-0.71	0.00	0.20	0.003	0.164	0.003	1.03	1.00	0.003		
Property Damage Only (PDO)	-5.04	0.45	1.06	0.016	(5) _{TOTAL} -(5) _{FI}	0.016	1.05	1.00	0.016		
Property Damage Only (PDO)	-5.04	0.45	1.00	0.016	0.836	0.016	1.05	1.00	0.016		

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(F1)	Predicted N brsv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N brsv (PDO) (crashes/year)	Predicted N _{brsv (TOTAL)} (crashes/year)
,	from Table 12-6	(9) _{FI} from Worksheet 1E	from Table 12-6	(9)PDO from Worksheet 1E	(9)TOTAL from Worksheet 1E
Total	1.000	0.003	1.000	0.016	0.020
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.001	0.000	0.063	0.001	0.001
Collision with fixed object	0.500	0.002	0.813	0.013	0.015
Collision with other object	0.028	0.000	0.016	0.000	0.000
Other single-vehicle collision	0.471	0.002	0.108	0.002	0.003

Work	sheet 1G Multiple-Vehicle Drive	way-Related Collisions by	y Driveway Type for Urban	and Suburban Roadway Segments	
(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	Number of driveways,	Crashes per driveway per year, N _j	Coefficient for traffic adjustment, t	Initial N _{brdwy}	Overdispersion parameter, k
	n _i	from Table 12-7	from Table 12-7	Equation 12-16	from Table 12-7
	•	ITOTTI TADIE 12-7	ITOTTI TABLE 12-7	n _j * N _j * (AADT/15,000) ^t	
Major commercial	0	0.033	1.106	0.000	
Minor commercial	0	0.011	1.106	0.000	
Major industrial/institutional	0	0.036	1.106	0.000	
Minor industrial/institutional	0	0.005	1.106	0.000	
Major residential	0	0.018	1.106	0.000	
Minor residential	0	0.003	1.106	0.000	
Other	0	0.005	1.106	0.000	
Total				0.000	1.39

Worksheet 1H Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(7)		
Crach Savarity Laval	Initial N _{brdwy}	Proportion of total crashes (f _{dwy})	Adjusted N _{brdwy}	Combined CMFs	Calibration factor, C,	Predicted N _{brdwy}		
Crash Severity Level	(5) _{TOTAL} from Worksheet 1G	from Table 12-7	(2) _{TOTAL} * (3)	(6) from Worksheet 1B	, ,	(4)*(5)*(6)		
Total	0.000	1.000	0.000	1.05	1.00	0.000		
Fatal and injury (FI)		0.284	0.000	1.05	1.00	0.000		
Property damage only (PDO)		0.716	0.000	1.05	1.00	0.000		

Worksheet 1I Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments										
(1)	(2)	(3)	(4)	(5)	(6)	(8)*				
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{pedr}	Predicted N _{pedr}				
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8	(5)*(6)				
Гotal	0.077	0.020	0.000	0.097	0.067	0.006				
atal and injury (FI)						0.006				

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-19

Worksheet 1J Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)	(8)*			
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{biker}	Predicted N _{biker}			
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9	(5)*(6)			
Total	0.077	0.020	0.000	0.097	0.013	0.001			
Fatal and injury (FI)						0.001			

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-20

(1)	(2)	(3)	(4)
(*/	Fatal and injury (FI)	Property damage only (PDO)	Total
N 10: 1 /	(3) from Worksheet 1D and 1F;	(5) from Worksheet 1D and 1F; and	(6) from Worksheet 1D and 1F;
Collision type	(7) from Worksheet 1H; and	(7) from Worksheet 1H	(7) from Worksheet 1H; and
	(8) from Worksheet 1I and 1J		(8) from Worksheet 1I and 1J
	MULTIPLE-VEHICLE	•	
Rear-end collisions (from Worksheet 1D)	0.018	0.037	0.055
lead-on collisions (from Worksheet 1D)	0.000	0.000	0.001
ingle collisions (from Worksheet 1D)	0.001	0.002	0.003
Sideswipe, same direction (from Worksheet 1D)	0.001	0.012	0.013
Sideswipe, opposite direction (from Worksheet 1D)	0.000	0.000	0.000
Priveway-related collisions (from Worksheet 1H)	0.000	0.000	0.000
Other multiple-vehicle collision (from Worksheet 1D)	0.001	0.004	0.005
Subtotal	0.022	0.055	0.077
	SINGLE-VEHICLE		•
Collision with animal (from Worksheet 1F)	0.000	0.001	0.001
Collision with fixed object (from Worksheet 1F)	0.002	0.013	0.015
Collision with other object (from Worksheet 1F)	0.000	0.000	0.000
Other single-vehicle collision (from Worksheet 1F)	0.002	0.002	0.003
Collision with pedestrian (from Worksheet 1I)	0.006	0.000	0.006
Collision with bicycle (from Worksheet 1J)	0.001	0.000	0.001
Subtotal	0.011	0.016	0.027
otal	0.033	0.072	0.105

Worksheet 1L Summary Results for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)					
Crash Severity Level	Predicted average crash frequency, N predicted rs (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)					
	(Total) from Worksheet 1K		(2) / (3)					
Total	0.1	0.03	3.5					
Fatal and injury (FI)	0.0	0.03	1.1					
Property damage only (PDO)	0.1	0.03	2.4					

	Worksheet 2A General Information and Input	Data for Orban and Suburban An	
	nformation		Location Information
Analyst	TL	Roadway	Westlake Terrace
Agency or Company	ATCS	Intersection	At I-270 Ramp Terminal
Date Performed	01/20/22	Jurisdiction	City of Rockville
		Analysis Year	2045
	ıt Data	Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)			3SG
AADT _{major} (veh/day)	$AADT_{MAX} = 58,100 (veh/day)$		20,540
AADT minor (veh/day)	$AADT_{MAX} = 16,400 (veh/day)$		8,279
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C _i		1.00	1.00
Data for unsignalized intersections only:			
Number of major-road approaches with left-	turn lanes (0,1,2)	0	0
Number of major-road approaches with righ	t-turn lanes (0,1,2)	0	0
Data for signalized intersections only:			
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	1
Number of approaches with right-turn lanes	(0,1,2,3,4) [for 3SG, use maximum value of 3]	0	1
Number of approaches with left-turn signal	phasing [for 3SG, use maximum value of 3]		0
Type of left-turn signal phasing for Leg #1		Permissive	Permissive
Type of left-turn signal phasing for Leg #2			Not Applicable
Type of left-turn signal phasing for Leg #3			Protected
Type of left-turn signal phasing for Leg #4 (i	f applicable)		Not Applicable
11 0	d prohibited [for 3SG, use maximum value of 3]	0	0
Intersection red light cameras (present/not p		Not Present	Not Present
Sum of all pedestrian crossing volumes (Pe			54
Maximum number of lanes crossed by a pe	(Idilosk)		5
Number of bus stops within 300 m (1,000 ft)		0	3
Schools within 300 m (1,000 ft) of the inters	1 /	Not Present	Not Present
Number of alcohol sales establishments wit	nin 300 m (1,000 ft) of the intersection	0	0

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(6)	(7)				
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF				
	Phasing									
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}				
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)				
0.93	1.00	0.96	1.00	0.91	1.00	0.81				

	Worksheet 2C Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections										
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Crash Severity Level	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
-			Parameter, k	Initial N _{bimv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bimv}		
	fr	om Table 12-1	0	from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from	1	(6)*(7)*(8)	
	а	b	С	IIOIII Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)	
Total	-12.13	1.11	0.26	0.33	3.449	1.000	3.449	0.81	1.00	2.804	
Fotal and Injuny (FI)	-11.58	44.50	1.02 0.17	0.00	4.006	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	1.141	0.81	4.00	0.000	
Fatal and Injury (FI)	-11.30	1.02	0.17	0.30	0.30 1.086		1.141	0.01	1.00	0.928	
Property Damage Only	40.04	4.44	0.00	0.00	0.400	(5) _{TOTAL} -(5) _{FI}	0.000	0.04	4.00	4.070	
(PDO)	-13.24	1.14	0.30	0.36	2.196	0.669	2.308	0.81	1.00	1.876	

	Worksheet 2D Multiple-	Vehicle Collisions by Collis	sion Type for Urban and Suburb	an Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type(FI)	Predicted N bimv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv (TOTAL)} (crashes/year)
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C
Total	1.000	0.928	1.000	1.876	2.804
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.549	0.509	0.546	1.025	1.534
Head-on collision	0.038	0.035	0.020	0.038	0.073
Angle collision	0.280	0.260	0.204	0.383	0.643
Sideswipe	0.076	0.071	0.032	0.060	0.131
Other multiple-vehicle collision	0.057	0.053	0.198	0.372	0.424

		Worksheet	2E Single-V	ehicle Collisions by Severi	ty Level for Urban	and Suburban Arterial In	tersections			
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
			Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}	
Crash Severity Level	fr	rom Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)
	а	b c	С	from Table 12-12	(FI) from Eqn. 12-		(+)TOTAL (3)	Worksheet 2B		(0) (1) (0)
	а	D	C		24 or 12-27					
Total	-9.02	0.42	0.40	0.36	0.289	1.000	0.289	0.81	1.00	0.235
Fatal and Injury (FI)	-9.75	0.27	0.51	0.24	0.085	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.088	0.81	1.00	0.071
Fatal and injury (FI)	-9.75	0.27	0.51	0.24	0.065	0.303	0.000	0.01	1.00	0.071
Property Damage Only	0.00	0.45	0.22	0.53	0.405	(5) _{TOTAL} -(5) _{FI}	0.202	0.04	4.00	0.464
(PDO)	-9.08	0.45	0.33	0.53	0.195	0.697	0.202	0.81	1.00	0.164

	Worksheet 2F Single-V	ehicle Collisions by Collis	ion Type for Urban and Suburba	n Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type(FI)	Predicted N _{bisv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv} (TOTAL) (crashes/year)
	from Table 12-13	(9)FI from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.071	1.000	0.164	0.235
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.001	0.000	0.003	0.000	0.001
Collision with fixed object	0.653	0.047	0.895	0.147	0.193
Collision with other object	0.091	0.006	0.069	0.011	0.018
Other single-vehicle collision	0.045	0.003	0.018	0.003	0.006
Single-vehicle noncollision	0.209	0.015	0.014	0.002	0.017

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)) (2) (3) (4) (5)								
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}				
Clash Severity Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total									
Fatal and injury (FI)				-					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections								
(1)	(2)	(3)	(4)						
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF						
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CiviF						
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)						
4.15	1.00	1.00	4.15						

		Workshe	et 2I Vehicle	-Pedestrian C	ollisions for l	Jrban and Suburba	n Arterial Signalized Inte	rsections		
(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	SPF Coefficients					Overdispersion	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}
Crash Seventy Level		fı	om Table 12-1	4		Parameter, k	from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)
	а	b	С	d	е		nom Equation 12 20	(4) HOIN WORKSHEET ZIT		(4) (0) (0)
Total	-6.60	0.05	0.24	0.41	0.09	0.52	0.015	4.15	1.00	0.061
Fatal and Injury (FI)							-		1.00	0.061

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections										
(1)	(2)	(3)	(4)	(5)	(7)*					
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}					
Crasii Severity Lever	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)					
Total	2.804	0.235	3.039	0.011	0.033					
Fatal and injury (FI)				-	0.033					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksh	neet 2K Crash Severity Distribution for Urban a	nd Suburban Arterial Intersections	
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE		• • •
Rear-end collisions (from Worksheet 2D)	0.509	1.025	1.534
Head-on collisions (from Worksheet 2D)	0.035	0.038	0.073
Angle collisions (from Worksheet 2D)	0.260	0.383	0.643
Sideswipe (from Worksheet 2D)	0.071	0.060	0.131
Other multiple-vehicle collision (from Worksheet 2D)	0.053	0.372	0.424
Subtotal	0.928	1.876	2.804
	SINGLE-VEHICLE		
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.001
Collision with fixed object (from Worksheet 2F)	0.047	0.147	0.193
Collision with other object (from Worksheet 2F)	0.006	0.011	0.018
Other single-vehicle collision (from Worksheet 2F)	0.003	0.003	0.006
Single-vehicle noncollision (from Worksheet 2F)	0.015	0.002	0.017
Collision with pedestrian (from Worksheet 2G or 2I)	0.061	0.000	0.061
Collision with bicycle (from Worksheet 2J)	0.033	0.000	0.033
Subtotal	0.166	0.164	0.330
Total	1.093	2.040	3.134

Worksheet 2L Summary Results for Urban and Suburban Arterial Intersections							
(1) (2)							
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)						
	(Total) from Worksheet 2K						
Total	3.1						
Fatal and injury (FI)	1.1						
Property damage only (PDO)	2.0						

Worksheet	1A General Information	n and Input D	ata for Urban and Suburba	n Roadway S	Segments	
General Information			Location Information			
Analyst	PK		Roadway		Westlake Terrace	
Agency or Company	ATCS		Roadway Section		I-270 Spur Ramps to Rockledge Dr	
Date Performed	10/09/20		Jurisdiction		City of Rockville	
			Analysis Year		2045	
Input Data		Base Conditions		Site Conditions		
Roadway type (2U, 3T, 4U, 4D, ST)					4D	
Length of segment, L (mi)					0.05	
AADT (veh/day)	$AADT_{MAX} = 66,000$	(veh/day)			17,822	
Type of on-street parking (none/parallel/angle)			None		None	
Proportion of curb length with on-street parking					0	
Median width (ft) - for divided only			15		15	
Lighting (present / not present)			Not Present		Present	
Auto speed enforcement (present / not present)			Not Present		Not Present	
Major commercial driveways (number)					0	
Minor commercial driveways (number)					0	
Major industrial / institutional driveways (number)					0	
Minor industrial / institutional driveways (number)					0	
Major residential driveways (number)					0	
Minor residential driveways (number)					0	
Other driveways (number)					0	
Speed Category					Posted Speed 30 mph or Lower	
Roadside fixed object density (fixed objects / mi)			0		40	
Offset to roadside fixed objects (ft) [If greater than 30 or Not Pr	esent, input 30]		30		12	
Calibration Factor, Cr			1.00		1.00	

Worksheet 1B Crash Modification Factors for Urban and Suburban Roadway Segments										
(1)	(2)	(3)	(4)	(5)	(6)					
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF					
CMF 1r	CMF 2r	CMF 3r	CMF 4r	CMF 5r	CMF comb					
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)					
1.00	1.08	1.00	0.91	1.00	0.98					

	Worksheet 1C Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments										
(1)	(2)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
			Parameter, k	Initial N _{brmv}	Crashes	N _{brmv}	CMFs	Factor, Cr	N _{brmv}		
	from Ta	ble 12-3	from Table 12-3	om Table 12-3 from Equation 12-10		from Table 12.2 from Equation 12.10		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)
	а	b	Holli Table 12-3	IIOIII Equation 12-10		(4)TOTAL (3)	Worksheet 1B	(0) (1) (8)			
Total	-12.34	1.36	1.32	0.132	1.000	0.132	0.98	1.00	0.130		
Fotal and Injury (FI)	-12.76	1.28	1.31	0.040	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.037	0.98	1.00	0.037		
Fatal and Injury (FI)	-12.70	1.20	1.31	0.040	0.283	0.037	0.90	1.00	0.037		
Promonty Domono Only (PDO)	40.04	4.20	4.24	0.400	(5) _{TOTAL} -(5) _{FI}	0.005	0.00	1.00	0.000		
Property Damage Only (PDO)	-12.81	1.38	1.34	0.100	0.717	0.095	0.98	1.00	0.093		

Wor	Worksheet 1D Multiple-Vehicle Nondriveway Collisions by Collision Type for Urban and Suburban Roadway Segments										
(1)	(2)	(3)	(4)	(5)	(6)						
Collision Type	Proportion of Collision Type _(FI)	•		Predicted N brmv (PDO) (crashes/year)	Predicted N _{brmv (TOTAL)} (crashes/year)						
	from Table 12-4	(9) _{FI} from Worksheet 1C	from Table 12-4	(9)PDO from Worksheet 1C	(9)TOTAL from Worksheet 1C						
Total	1.000	0.037	1.000	0.093	0.130						
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)						
Rear-end collision	0.832	0.031	0.662	0.062	0.092						
Head-on collision	0.020	0.001	0.007	0.001	0.001						
Angle collision	0.040	0.001	0.036	0.003	0.005						
Sideswipe, same direction	0.050	0.002	0.223	0.021	0.023						
Sideswipe, opposite direction	0.010	0.000	0.001	0.000	0.000						
Other multiple-vehicle collision	0.048	0.002	0.071	0.007	0.008						

	Worksheet 1E Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments										
(1)	(2	2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)		
	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
Crash Severity Level			Parameter, k	Initial N _{brsv}	Crashes	N _{brsv}	CMFs	Factor, Cr	N _{brsv}		
Clasii Severity Level	from Ta	ble 12-5	from Table 12-5 from Equation 12-13			(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)		
	а	b	Holli Table 12-3	IIOIII Equation 12-13		(+)TOTAL (3)	Worksheet 1B		(0) (1) (0)		
Total	-5.05	0.47	0.86	0.032	1.000	0.032	0.98	1.00	0.031		
Fatal and Injury (FI)	-8.71	0.66	0.28	0.005	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.005	0.98	1.00	0.005		
ratarand injury (i i)	-0.71	0.00	0.20	0.003	0.166	0.003	0.90	1.00	0.003		
Dranauti Damaga Only (DDO)	5.04	0.45	4.00	0.000	(5) _{TOTAL} -(5) _{FI}	0.007	0.00	1.00	0.006		
Property Damage Only (PDO)	-5.04	0.45	1.06	0.026	0.834	0.027	0.98	1.00	0.026		

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N brsv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N brsv (PDO) (crashes/year)	Predicted N _{brsv (TOTAL)} (crashes/year)
,	from Table 12-6	(9) _{FI} from Worksheet 1E	from Table 12-6	(9)PDO from Worksheet 1E	(9)TOTAL from Worksheet 1E
Total	1.000	0.005	1.000	0.026	0.031
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.001	0.000	0.063	0.002	0.002
Collision with fixed object	0.500	0.003	0.813	0.021	0.024
Collision with other object	0.028	0.000	0.016	0.000	0.001
Other single-vehicle collision	0.471	0.002	0.108	0.003	0.005

Workshee	t 1G Multiple-Vehicle Drive	way-Related Collisions by	y Driveway Type for Urban	and Suburban Roadway Segments	
(1)	(2)	(3)	(4)	(5)	(6)
Drivewey Type	Number of driveways,	Crashes per driveway per year, N _j	Coefficient for traffic adjustment, t	Initial N _{brdwy}	Overdispersion parameter, k
Driveway Type	n _i	from Table 12-7	from Table 12-7	Equation 12-16	from Table 12-7
	·	ITOTTI TADIE 12-7	ITOTTI TABLE 12-7	n _j * N _j * (AADT/15,000) ^t	Irom Table 12-7
Major commercial	0	0.033	1.106	0.000	
Minor commercial	0	0.011	1.106	0.000	
Major industrial/institutional	0	0.036	1.106	0.000	
Minor industrial/institutional	0	0.005	1.106	0.000	
Major residential	0	0.018	1.106	0.000	
Minor residential	0	0.003	1.106	0.000	
Other	0	0.005	1.106	0.000	
Total				0.000	1.39

Worksheet 1H Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)	(7)			
Crash Severity Level	Initial N _{brdwy}	Proportion of total crashes (f _{dwy})	Adjusted N _{brdwy}	Combined CMFs	Calibration factor, C,	Predicted N _{brdwy}			
	(5) _{TOTAL} from Worksheet 1G	from Table 12-7	(2) _{TOTAL} * (3)	(6) from Worksheet 1B	, ,	(4)*(5)*(6)			
Total	0.000	1.000	0.000	0.98	1.00	0.000			
Fatal and injury (FI)		0.284	0.000	0.98	1.00	0.000			
Property damage only (PDO)		0.716	0.000	0.98	1.00	0.000			

Worksheet 1I Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)	(8)*			
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{pedr}	Predicted N _{pedr}			
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8	(5)*(6)			
Total	0.130	0.031	0.000	0.161	0.067	0.011			
Fatal and injury (FI)						0.011			

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-19

Worksheet 1J Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)	(8)*			
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{biker}	Predicted N _{biker}			
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9	(5)*(6)			
Total	0.130	0.031	0.000	0.161	0.013	0.002			
Fatal and injury (FI)						0.002			

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-20

(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
N=11!=!=== 4	(3) from Worksheet 1D and 1F;	(5) from Worksheet 1D and 1F; and	(6) from Worksheet 1D and 1F;
Collision type	(7) from Worksheet 1H; and	(7) from Worksheet 1H	(7) from Worksheet 1H; and
	(8) from Worksheet 1I and 1J		(8) from Worksheet 1I and 1J
	MULTIPLE-VEHICLE	•	
Rear-end collisions (from Worksheet 1D)	0.031	0.062	0.092
lead-on collisions (from Worksheet 1D)	0.001	0.001	0.001
ingle collisions (from Worksheet 1D)	0.001	0.003	0.005
Sideswipe, same direction (from Worksheet 1D)	0.002	0.021	0.023
Sideswipe, opposite direction (from Worksheet 1D)	0.000	0.000	0.000
Priveway-related collisions (from Worksheet 1H)	0.000	0.000	0.000
Other multiple-vehicle collision (from Worksheet 1D)	0.002	0.007	0.008
Subtotal	0.037	0.093	0.130
	SINGLE-VEHICLE		
Collision with animal (from Worksheet 1F)	0.000	0.002	0.002
Collision with fixed object (from Worksheet 1F)	0.003	0.021	0.024
Collision with other object (from Worksheet 1F)	0.000	0.000	0.001
Other single-vehicle collision (from Worksheet 1F)	0.002	0.003	0.005
Collision with pedestrian (from Worksheet 1I)	0.011	0.000	0.011
Collision with bicycle (from Worksheet 1J)	0.002	0.000	0.002
Subtotal	0.018	0.026	0.044
otal	0.055	0.119	0.174

Worksheet 1L Summary Results for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)					
Crash Severity Level	Predicted average crash frequency, N predicted rs (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)					
	(Total) from Worksheet 1K		(2) / (3)					
Total	0.2	0.05	3.5					
Fatal and injury (FI)	0.1	0.05	1.1					
Property damage only (PDO)	0.1	0.05	2.4					

	Worksheet 2A General Information and Input	Data for Orban and Subdiban Al			
	Information		Location Information		
Analyst	PK	Roadway	Westlake Terrace		
Agency or Company	ATCS	Intersection	At Rockledge Drive		
Date Performed	10/09/20	Jurisdiction	City of Rockville		
		Analysis Year	2045		
	put Data	Base Conditions	Site Conditions		
Intersection type (3ST, 3SG, 4ST, 4SG)			4SG		
AADT _{major} (veh/day)	$AADT_{MAX} = 67,700 (veh/day)$		17,719		
AADT minor (veh/day)	$AADT_{MAX} = 33,400 (veh/day)$		13,056		
Intersection lighting (present/not present)		Not Present	Not Present		
Calibration factor, C _i		1.00	1.00		
Data for unsignalized intersections only:					
Number of major-road approaches with le	ft-turn lanes (0,1,2)	0	0		
Number of major-road approaches with rig	ht-turn lanes (0,1,2)	0	0		
Data for signalized intersections only:					
Number of approaches with left-turn lanes	(0,1,2,3,4) [for 3SG, use maximum value of 3]	0	3		
Number of approaches with right-turn lane	es (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	2		
Number of approaches with left-turn signa	l phasing [for 3SG, use maximum value of 3]		4		
Type of left-turn signal phasing for Leg #1		Permissive	Permissive / Protected		
Type of left-turn signal phasing for Leg #2			Permissive / Protected		
Type of left-turn signal phasing for Leg #3			Protected		
Type of left-turn signal phasing for Leg #4	(if applicable)		Protected		
Number of approaches with right-turn-on-r	red prohibited [for 3SG, use maximum value of 3]	0	0		
Intersection red light cameras (present/no		Not Present	Not Present		
Sum of all pedestrian crossing volumes (I	PedVol) Signalized intersections only		54		
Maximum number of lanes crossed by a p	edestrian (n _{lanesx})		5		
Number of bus stops within 300 m (1,000	,	0	6		
Schools within 300 m (1,000 ft) of the inte	1 /	Not Present	Not Present		
Number of alcohol sales establishments w	vithin 300 m (1.000 ft) of the intersection	0	0		

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(6)	(7)				
CMF for Left-Turn Lanes	CMF for Left-Turn Signal Phasing	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF				
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}				
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)				
0.73	0.87	0.92	1.00	1.00	1.00	0.58				

	Worksheet 2C Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections										
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
Crash Severity Level	S	PF Coefficien	ts	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
	1		Parameter, k	Initial N _{bimv}	Crashes	N _{bimv}	CMFs	Factor, C _i	N_{bimv}		
	fr	om Table 12-1	0	from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from	(6)*(7)*(8)		
	а	b	С	IIOIII Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)	
Total	-10.99	1.07	0.23	0.39	5.243	1.000	5.243	0.58	1.00	3.055	
Fotal and Injury (FI)	-13.14	1.18	0.22	0.33	1.629 (4) _{FI} /($(4)_{FI}/((4)_{FI}+(4)_{PDO})$	1.688	0.58	1.00	0.984	
Fatal and Injury (FI)	-13.14	1.10	0.22	0.33	1.029	0.322	1.000	0.56	1.00	0.964	
Property Damage Only	44.00	4.00	0.04	0.44	0.400	(5) _{TOTAL} -(5) _{FI}	0.554	0.50	4.00	0.074	
(PDO)	-11.02	1.02	0.24	0.44	3.430	0.678	3.554	0.58	1.00	2.071	

Worksheet 2D Multiple-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(6)				
Collision Type	Proportion of Collision Type _(FI)	Predicted N bimv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv (TOTAL)} (crashes/year)				
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C				
Total	1.000	0.984	1.000	2.071	3.055				
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)				
Rear-end collision	0.450	0.443	0.483	1.000	1.443				
Head-on collision	0.049	0.048	0.030	0.062	0.110				
Angle collision	0.347	0.341	0.244	0.505	0.847				
Sideswipe	0.099	0.097	0.032	0.066	0.164				
Other multiple-vehicle collision	0.055	0.054	0.211	0.437	0.491				

	Worksheet 2E Single-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections										
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
			Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}		
Crash Severity Level	fr	om Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)	
	а	b	С	from Table 12-12	(FI) from Eqn. 12-		(T)TOTAL (O)	Worksheet 2B		(0) (1) (0)	
	а	b	· ·		24 or 12-27						
Total	-10.21	0.68	0.27	0.36	0.368	1.000	0.368	0.58	1.00	0.215	
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.101	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.102	0.58	1.00	0.060	
Fatal and injury (FI)	-9.25	0.43	0.29	0.09	0.101	0.278	0.102	0.56	1.00	0.000	
Property Damage Only	44.04	0.70	0.05	0.44	0.000	(5) _{TOTAL} -(5) _{FI}	0.066	0.50	4.00	0.455	
(PDO)	-11.34	0.78	0.25	0.44	0.262	0.722	0.266	0.58	1.00	0.155	

	Worksheet 2F Single-V	ehicle Collisions by Collis	ion Type for Urban and Suburba	n Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bisv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv (TOTAL)} (crashes/year)
	from Table 12-13	(9)FI from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.060	1.000	0.155	0.215
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.000	0.000
Collision with fixed object	0.744	0.044	0.870	0.135	0.179
Collision with other object	0.072	0.004	0.070	0.011	0.015
Other single-vehicle collision	0.040	0.002	0.023	0.004	0.006
Single-vehicle noncollision	0.141	0.008	0.034	0.005	0.014

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(2)	(3)	(4)	(5)	(7)*				
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}				
Crash Seventy Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total									
Fatal and injury (FI)		-		-					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections							
(1)	(2)	(3)	(4)					
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF					
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CiviF					
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)					
4.15	1.00	1.00	4.15					

Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections											
(1)	(2)					(3)	(4)	(5)	(6)	(7)	
SPF Coefficients Crash Severity Level				Overdispersion	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}			
Crash Severity Level		from Table 12-14					from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)	
	а	b	С	d	е		Hom Equation 12-29	(4) HOIH WORKSHEEL ZIT		(4) (3) (0)	
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.031	4.15	1.00	0.128	
Fatal and Injury (FI)									1.00	0.128	

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections										
(1)	(2)	(3)	(4)	(5)	(7)*					
Creak Coverity Lavel	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}					
Crash Severity Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)					
Total	3.055	0.215	3.269	0.015	0.049					
atal and injury (FI)				1	0.049					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksheet 2K Crash Severity Distribution for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)						
	Fatal and injury (FI)	Property damage only (PDO)	Total						
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;						
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J						
	MULTIPLE-VEHICLE	·							
Rear-end collisions (from Worksheet 2D)	0.443	1.000	1.443						
Head-on collisions (from Worksheet 2D)	0.048	0.062	0.110						
Angle collisions (from Worksheet 2D)	0.341	0.505	0.847						
Sideswipe (from Worksheet 2D)	0.097	0.066	0.164						
Other multiple-vehicle collision (from Worksheet 2D)	0.054	0.437	0.491						
Subtotal	0.984	2.071	3.055						
	SINGLE-VEHICLE	•							
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000						
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000						
Collision with fixed object (from Worksheet 2F)	0.044	0.135	0.179						
Collision with other object (from Worksheet 2F)	0.004	0.011	0.015						
Other single-vehicle collision (from Worksheet 2F)	0.002	0.004	0.006						
Single-vehicle noncollision (from Worksheet 2F)	0.008	0.005	0.014						
Collision with pedestrian (from Worksheet 2G or 2I)	0.128	0.000	0.128						
Collision with bicycle (from Worksheet 2J)	0.049	0.000	0.049						
Subtotal	0.236	0.155	0.391						
Total	1.220	2.226	3.446						

Worksheet 2L Summary Results for Urban and Suburban Arterial Intersections							
(1)	(2)						
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)						
	(Total) from Worksheet 2K						
Total	3.4						
Fatal and injury (FI)	1.2						
Property damage only (PDO)	2.2						

0	Worksheet 2A General Information and Input	Data for Orban and Subdiban Ar			
	nformation		Location Information		
Analyst	PK	Roadway	Wootton Parkway		
Agency or Company	ATCS	Intersection	At Seven Locks Road		
Date Performed	10/09/20	Jurisdiction	Montgomery County		
		Analysis Year	2045		
	ıt Data	Base Conditions	Site Conditions		
Intersection type (3ST, 3SG, 4ST, 4SG)			4SG		
AADT _{major} (veh/day)	$AADT_{MAX} = 67,700 (veh/day)$		21,064		
AADT minor (veh/day)	$AADT_{MAX} = 33,400 (veh/day)$	-	19,607		
Intersection lighting (present/not present)		Not Present	Present		
Calibration factor, C _i		1.00	1.00		
Data for unsignalized intersections only:					
Number of major-road approaches with left-	turn lanes (0,1,2)	0	0		
Number of major-road approaches with righ	t-turn lanes (0,1,2)	0	0		
Data for signalized intersections only:					
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	3		
Number of approaches with right-turn lanes	(0,1,2,3,4) [for 3SG, use maximum value of 3]	0	3		
Number of approaches with left-turn signal p	phasing [for 3SG, use maximum value of 3]		3		
Type of left-turn signal phasing for Leg #1		Permissive	Permissive		
Type of left-turn signal phasing for Leg #2			Permissive / Protected		
Type of left-turn signal phasing for Leg #3			Protected		
Type of left-turn signal phasing for Leg #4 (i	f applicable)		Protected		
Number of approaches with right-turn-on-red	d prohibited [for 3SG, use maximum value of 3]	0	0		
Intersection red light cameras (present/not p		Not Present	Not Present		
Sum of all pedestrian crossing volumes (Pe	dVol) Signalized intersections only		122		
Maximum number of lanes crossed by a peo	destrian (n _{lanesx})		6		
Number of bus stops within 300 m (1,000 ft)		0	2		
Schools within 300 m (1,000 ft) of the interse	1 /	Not Present	Not Present		
Number of alcohol sales establishments with	nin 300 m (1,000 ft) of the intersection	0	0		

Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(6)	(7)			
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF			
	Phasing								
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}			
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)			
0.73	0.87	0.88	1.00	0.91	1.00	0.51			

	Worksheet 2C Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections										
(1)	(2)		(1) (2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
-			Parameter, k	Initial N _{bimv}	Crashes	N _{bimv}	CMFs	Factor, C _i	N_{bimv}		
	from Table 12-10 from Table 12-10		from Equation 12-	(4) *(5)	(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)			
	а	b	С	IIOIII Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)	
Total	-10.99	1.07	0.23	0.39	6.927	1.000	6.927	0.51	1.00	3.564	
Fotal and Injuny (FI)	-13.14	1.18	0.22	0.33	2.185	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	2.261	0.51	1.00	1.163	
Fatal and Injury (FI)	-13.14	1.10	0.22	0.33	2.100	0.326		0.51	1.00	1.103	
Property Damage Only	-11.02	1.02	0.24	0.44	4.511	(5) _{TOTAL} -(5) _{FI}	4.667	0.51	1.00	2.401	
(PDO)	-11.02	1.02	0.24	0.44	4.311	0.674	4.007	0.51	1.00	2.401	

Worksheet 2D Multiple-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections										
(1)	(2)	(3)	(4)	(5)	(6)					
Collision Type	Proportion of Collision Type _(FI)	Predicted N bimv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv (TOTAL)} (crashes/year)					
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C					
Total	1.000	1.163	1.000	2.401	3.564					
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)					
Rear-end collision	0.450	0.523	0.483	1.160	1.683					
Head-on collision	0.049	0.057	0.030	0.072	0.129					
Angle collision	0.347	0.404	0.244	0.586	0.989					
Sideswipe	0.099	0.115	0.032	0.077	0.192					
Other multiple-vehicle collision	0.055	0.064	0.211	0.507	0.571					

	Worksheet 2E Single-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections										
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
	S	PF Coefficient	ts	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
			Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}		
Crash Severity Level	fr	om Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)	
	2	b	С	from Table 12-12	(FI) from Eqn. 12-		(T)TOTAL (S)	Worksheet 2B		(0) (1) (0)	
	а	b	C		24 or 12-27						
Total	-10.21	0.68	0.27	0.36	0.462	1.000	0.462	0.51	1.00	0.238	
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.122	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.124	0.51	1.00	0.064	
Fatal and injury (FI)	-9.25	0.43	0.29	0.09	0.122	0.269	0.124	0.51	1.00	0.004	
Property Damage Only	44.04	0.70	0.05	0.44	0.222	(5) _{TOTAL} -(5) _{FI}	0.220	0.54	4.00	0.474	
(PDO)	-11.34	0.78	0.25	0.44	0.332	0.731	0.338	0.51	1.00	0.174	

	Worksheet 2F Single-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections										
(1)	(2)	(3)	(4)	(5)	(6)						
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bisv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv (TOTAL)} (crashes/year)						
	from Table 12-13	(9)FI from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E						
Total	1.000	0.064	1.000	0.174	0.238						
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)						
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000						
Collision with animal	0.002	0.000	0.002	0.000	0.000						
Collision with fixed object	0.744	0.048	0.870	0.151	0.199						
Collision with other object	0.072	0.005	0.070	0.012	0.017						
Other single-vehicle collision	0.040	0.003	0.023	0.004	0.007						
Single-vehicle noncollision	0.141	0.009	0.034	0.006	0.015						

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(2)	(3)	(4)	(5)	(7)*				
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}				
Clash Severity Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total									
Fatal and injury (FI)				-					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections								
(1)	(2)	(3)	(4)						
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF						
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CiviF						
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)						
2.78	1.00	1.00	2.78						

		Workshe	et 2I Vehicle	-Pedestrian C	ollisions for l	Jrban and Suburba	n Arterial Signalized Inte	rsections		
(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	SPF Coefficients					Overdispersion	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}
Crash Seventy Level		from Table 12-14					from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)
	а	b	С	d	е		Hom Equation 12-29	(4) HOIH WORKSHEEL ZIT		(4) (3) (0)
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.055	2.78	1.00	0.153
Fatal and Injury (FI)					1		1.00	0.153		

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(7)*				
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}				
Crash Severity Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)				
Total	3.564	0.238	3.802	0.015	0.057				
Fatal and injury (FI)					0.057				

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

	eet 2K Crash Severity Distribution for Urban a		
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE	<u> </u>	
Rear-end collisions (from Worksheet 2D)	0.523	1.160	1.683
Head-on collisions (from Worksheet 2D)	0.057	0.072	0.129
Angle collisions (from Worksheet 2D)	0.404	0.586	0.989
Sideswipe (from Worksheet 2D)	0.115	0.077	0.192
Other multiple-vehicle collision (from Worksheet 2D)	0.064	0.507	0.571
Subtotal	1.163	2.401	3.564
	SINGLE-VEHICLE		•
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 2F)	0.048	0.151	0.199
Collision with other object (from Worksheet 2F)	0.005	0.012	0.017
Other single-vehicle collision (from Worksheet 2F)	0.003	0.004	0.007
Single-vehicle noncollision (from Worksheet 2F)	0.009	0.006	0.015
Collision with pedestrian (from Worksheet 2G or 2I)	0.153	0.000	0.153
Collision with bicycle (from Worksheet 2J)	0.057	0.000	0.057
Subtotal	0.274	0.174	0.448
Total	1.437	2.575	4.012

Worksheet 2L Summary Results for Urban and Suburban Arterial Intersections						
(1)						
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)					
	(Total) from Worksheet 2K					
Total	4.0					
Fatal and injury (FI)	1.4					
Property damage only (PDO)	2.6					

Worksheet	1A General In	formation	and Input D	ata for Urban and Suburba	n Roadway	Segments	
General Information				Location Information			
Analyst		PK		Roadway	Wootton Parkway		
Agency or Company		ATCS		Roadway Section		Seven Locks Rd to Tower Oaks Blvd	
Date Performed	1	10/09/20		Jurisdiction		Montgomery County	
				Analysis Year		2045	
Input Data			Base Conditions	Site Conditions			
Roadway type (2U, 3T, 4U, 4D, ST)						4D	
Length of segment, L (mi)						0.32	
AADT (veh/day)	AADT _{MAX} =	66,000	(veh/day)			20,340	
Type of on-street parking (none/parallel/angle)				None		None	
Proportion of curb length with on-street parking						0	
Median width (ft) - for divided only				15		15	
Lighting (present / not present)				Not Present		Present	
Auto speed enforcement (present / not present)				Not Present		Not Present	
Major commercial driveways (number)						1	
Minor commercial driveways (number)						0	
Major industrial / institutional driveways (number)						0	
Minor industrial / institutional driveways (number)						0	
Major residential driveways (number)						0	
Minor residential driveways (number)						0	
Other driveways (number)						0	
Speed Category						Posted Speed Greater than 30 mph	
Roadside fixed object density (fixed objects / mi)	•	•		0		44	
Offset to roadside fixed objects (ft) [If greater than 30 or Not Pr	esent, input 30]	•		30		15	
Calibration Factor, Cr		•		1.00		1.00	

Worksheet 1B Crash Modification Factors for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)				
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF				
CMF 1r	CMF 2r	CMF 3r	CMF 4r	CMF 5r	CMF comb				
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)				
1.00	1.07	1.00	0.91	1.00	0.98				

	Worksheet 1C Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments										
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Crash Severity Level	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
			Parameter, k	Initial N _{brmv}	Crashes	N_{brmv}	CMFs	Factor, Cr	N _{brmv}		
	from Ta	ble 12-3	from Table 12-3 from Equation 12-10		(4) _{TOTAL} *(5)		(6) from	1 (6)			
	а	b	Holli Table 12-3	IIOIII Equation 12-10		(4)TOTAL (3)	Worksheet 1B	(6)*(7)*(8			
Total	-12.34	1.36	1.32	1.012	1.000	1.012	0.98	1.00	0.990		
Fotol and Injury (FI)	-12.76	1.28	1.31	0.301	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.284	0.98	1.00	0.278		
Fatal and Injury (FI)	-12.70	1.20	1.31	0.301	0.280	0.204	0.96	1.00	0.276		
D	40.04	4.00	4.04	0.770	(5) _{TOTAL} -(5) _{FI}	0.700	0.00	4.00	0.740		
Property Damage Only (PDO)	-12.81	1.38	1.34	0.772	0.720	0.728	0.98	1.00	0.713		

Worksh	eet 1D Multiple-Vehicle No	ndriveway Collisions by	Collision Type for Urban an	d Suburban Roadway Se	egments
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N brmv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N _{brmv} (PDO) (crashes/year)	Predicted N _{brmv (TOTAL)} (crashes/year)
	from Table 12-4	(9) _{FI} from Worksheet 1C	from Table 12-4	(9)PDO from Worksheet 1C	(9)TOTAL from Worksheet 1C
Total	1.000	0.278	1.000	0.713	0.990
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.832	0.231	0.662	0.472	0.703
Head-on collision	0.020	0.006	0.007	0.005	0.011
Angle collision	0.040	0.011	0.036	0.026	0.037
Sideswipe, same direction	0.050	0.014	0.223	0.159	0.173
Sideswipe, opposite direction	0.010	0.003	0.001	0.001	0.003
Other multiple-vehicle collision	0.048	0.013	0.071	0.051	0.064

	Worksheet 1E Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments									
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
Crash Severity Level			Parameter, k	Initial N _{brsv}	Crashes	N_{brsv}	CMFs	Factor, Cr	N_{brsv}	
Clash Seventy Level	from Ta	ble 12-5	from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)	
	а	b	Holli Table 12-3	Holli Equation 12-13		(T)TOTAL (S)	Worksheet 1B		(0) (1) (0)	
Total	-5.05	0.47	0.86	0.217	1.000	0.217	0.98	1.00	0.213	
Fatal and Injury (FI)	-8.71	0.66	0.28	0.037	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.037	0.98	1.00	0.036	
i atai and injury (i i)	-0.71	0.00	0.20	0.037	0.170	0.037	0.90	1.00	0.030	
Property Democra Only (PDO)	5.04	0.45	1.06	0.400	(5) _{TOTAL} -(5) _{FI}	0.400	0.00	4.00	0.476	
Property Damage Only (PDO)	-5.04	0.45	1.06	0.180	0.830	0.180	0.98	1.00	0.176	

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N brsv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N brsv (PDO) (crashes/year)	Predicted N _{brsv (TOTAL)} (crashes/year)
,	from Table 12-6	(9) _{FI} from Worksheet 1E	from Table 12-6	(9)PDO from Worksheet 1E	(9)TOTAL from Worksheet 1E
Total	1.000	0.036	1.000	0.176	0.213
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.001	0.000	0.063	0.011	0.011
Collision with fixed object	0.500	0.018	0.813	0.143	0.161
Collision with other object	0.028	0.001	0.016	0.003	0.004
Other single-vehicle collision	0.471	0.017	0.108	0.019	0.036

Work	ksheet 1G Multiple-Vehicle Drive	way-Related Collisions by	y Driveway Type for Urban	and Suburban Roadway Segments	
(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	Number of driveways,	Crashes per driveway per year, N _j	Coefficient for traffic adjustment, t	Initial N _{brdwy}	Overdispersion parameter, k
	n _i	from Table 12-7	from Table 12-7	Equation 12-16	from Table 12-7
	,	Hom rable 12-7	ITOTTI TABLE 12-7	n _j * N _j * (AADT/15,000) ^t	IIOIII Table 12-7
Major commercial	1	0.033	1.106	0.046	
Minor commercial	0	0.011	1.106	0.000	
Major industrial/institutional	0	0.036	1.106	0.000	
Minor industrial/institutional	0	0.005	1.106	0.000	
Major residential	0	0.018	1.106	0.000	
Minor residential	0	0.003	1.106	0.000	
Other	0	0.005	1.106	0.000	
Total			==	0.046	1.39

Worksheet 1H Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)	(7)			
Creab Savarity Laval	Initial N _{brdwy}	Proportion of total crashes (f _{dwy})	Adjusted N _{brdwy}	Combined CMFs	Calibration factor, C,	Predicted N _{brdwy}			
Crash Severity Level	(5) _{TOTAL} from Worksheet 1G	from Table 12-7	(2) _{TOTAL} * (3)	(6) from Worksheet 1B	, ,	(4)*(5)*(6)			
Total	0.046	1.000	0.046	0.98	1.00	0.045			
Fatal and injury (FI)		0.284	0.013	0.98	1.00	0.013			
Property damage only (PDO)		0.716	0.033	0.98	1.00	0.032			

Worksheet 1I Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments										
(1)	(2)	(3)	(4)	(5)	(6)	(8)*				
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{pedr}	Predicted N _{pedr}				
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8	(5)*(6)				
Total	0.990	0.213	0.045	1.248	0.019	0.024				
Fatal and injury (FI)						0.024				

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-19

Worksheet 1J Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments										
(1)	(2)	(3)	(4)	(5)	(6)	(8)*				
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{biker}	Predicted N _{biker}				
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9	(5)*(6)				
Total	0.990	0.213	0.045	1.248	0.005	0.006				
Fatal and injury (FI)						0.006				

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-20

Worksheet 1K Crash Severity Distribution for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)				
· · · · · · · · · · · · · · · · · · ·	Fatal and injury (FI)	Property damage only (PDO)	Total				
Callinian type	(3) from Worksheet 1D and 1F;	(5) from Worksheet 1D and 1F; and	(6) from Worksheet 1D and 1F;				
Collision type	(7) from Worksheet 1H; and	(7) from Worksheet 1H	(7) from Worksheet 1H; and				
	(8) from Worksheet 1I and 1J	, ,	(8) from Worksheet 1I and 1J				
	MULTIPLE-VEHICLE	•	,				
Rear-end collisions (from Worksheet 1D)	0.231	0.472	0.703				
Head-on collisions (from Worksheet 1D)	0.006	0.005	0.011				
Angle collisions (from Worksheet 1D)	0.011	0.026	0.037				
Sideswipe, same direction (from Worksheet 1D)	0.014	0.159	0.173				
Sideswipe, opposite direction (from Worksheet 1D)	0.003	0.001	0.003				
Driveway-related collisions (from Worksheet 1H)	0.013	0.032	0.045				
Other multiple-vehicle collision (from Worksheet 1D)	0.013	0.051	0.064				
Subtotal	0.291	0.745	1.036				
	SINGLE-VEHICLE	·					
Collision with animal (from Worksheet 1F)	0.000	0.011	0.011				
Collision with fixed object (from Worksheet 1F)	0.018	0.143	0.161				
Collision with other object (from Worksheet 1F)	0.001	0.003	0.004				
Other single-vehicle collision (from Worksheet 1F)	0.017	0.019	0.036				
Collision with pedestrian (from Worksheet 1I)	0.024	0.000	0.024				
Collision with bicycle (from Worksheet 1J)	0.006	0.000	0.006				
Subtotal	0.066	0.176	0.242				
Total	0.357	0.921	1.278				

Worksheet 1L Summary Results for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)					
Crash Severity Level	Predicted average crash frequency, N $_{\rm predicted\ rs}$ (crashes/year)	Roadway segment length, L (mi)						
	(Total) from Worksheet 1K		(2) / (3)					
Total	1.3	0.32	4.0					
Fatal and injury (FI)	0.4	0.32	1.1					
Property damage only (PDO)	0.9	0.32	2.9					

	Worksheet 2A General Information and Input	Data for Orban and Suburban Ai	
	l Information		Location Information
Analyst	PK	Roadway	Wootton Parkway
Agency or Company	ATCS	Intersection	At Tower Oaks Boulevard
Date Performed	10/09/20	Jurisdiction	Montgomery County
		Analysis Year	2045
	out Data	Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)			4SG
AADT _{major} (veh/day)	$AADT_{MAX} = 67,700 (veh/day)$		20,273
AADT _{minor} (veh/day)	$AADT_{MAX} = 33,400 (veh/day)$	-	6,777
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C _i		1.00	1.00
Data for unsignalized intersections only:			
Number of major-road approaches with lef	t-turn lanes (0,1,2)	0	0
Number of major-road approaches with rig	ht-turn lanes (0,1,2)	0	0
Data for signalized intersections only:			
Number of approaches with left-turn lanes	(0,1,2,3,4) [for 3SG, use maximum value of 3]	0	4
Number of approaches with right-turn lane	s (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	4
Number of approaches with left-turn signal	phasing [for 3SG, use maximum value of 3]		4
Type of left-turn signal phasing for Leg #1		Permissive	Protected
Type of left-turn signal phasing for Leg #2			Permissive / Protected
Type of left-turn signal phasing for Leg #3			Permissive / Protected
Type of left-turn signal phasing for Leg #4	(if applicable)		Permissive / Protected
11	ed prohibited [for 3SG, use maximum value of 3]	0	0
Intersection red light cameras (present/not		Not Present	Not Present
Sum of all pedestrian crossing volumes (F			122
Maximum number of lanes crossed by a pe	edestrian (n _{lanesx})		7
Number of bus stops within 300 m (1,000 f	,	0	2
Schools within 300 m (1,000 ft) of the inter	\(\)	Not Present	Not Present
Number of alcohol sales establishments w	ithin 300 m (1,000 ft) of the intersection	0	0

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(6)	(7)				
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF				
	Phasing									
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}				
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)				
0.66	0.91	0.85	1.00	0.91	1.00	0.47				

	Worksheet 2C Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections										
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Crash Severity Level	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
			Parameter, k	Initial N _{bimv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bimv}		
	fr	om Table 12-1	0	from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from	Ī	(6)*(7)*(8)	
	а	b	С	IIOIII Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)	
Total	-10.99	1.07	0.23	0.39	5.208	1.000	5.208	0.47	1.00	2.425	
Fotal and Injury (FI)	-13.14	1.18	0.22	0.33	1.653	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	1.717	0.47	1.00	0.799	
Fatal and Injury (FI)	-13.14	1.10	0.22	0.33	1.000	0.330	1.717	0.47		0.799	
Property Damage Only	44.00	4.00	0.04	0.44	0.000	(5) _{TOTAL} -(5) _{FI}	0.404	0.47	4.00	4.005	
(PDO)	-11.02	1.02	0.24	0.44	3.362	0.670	3.491	0.47	1.00	1.625	

Worksheet 2D Multiple-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections										
(1)	(2)	(3)	(4)	(5)	(6)					
Collision Type	Proportion of Collision Type(FI)	Predicted N bimv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv (TOTAL)} (crashes/year)					
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C					
Total	1.000	0.799	1.000	1.625	2.425					
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)					
Rear-end collision	0.450	0.360	0.483	0.785	1.145					
Head-on collision	0.049	0.039	0.030	0.049	0.088					
Angle collision	0.347	0.277	0.244	0.397	0.674					
Sideswipe	0.099	0.079	0.032	0.052	0.131					
Other multiple-vehicle collision	0.055	0.044	0.211	0.343	0.387					

		Worksheet	2E Single-V	ehicle Collisions by Severi	ty Level for Urban a	and Suburban Arterial In	tersections			
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
			Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, Ci	N_{bisv}	
Crash Severity Level	fr	rom Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from	Ī	(6)*(7)*(8)
	а	b	С	from Table 12-12	(FI) from Eqn. 12-		(T)TOTAL (S)	Worksheet 2B		(0) (1) (0)
	а	D	C		24 or 12-27					
Total	-10.21	0.68	0.27	0.36	0.338	1.000	0.338	0.47	1.00	0.157
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.088	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.089	0.47	1.00	0.041
Fatai and injury (Fi)	-9.25	0.43	0.29	0.09	0.000	0.263	0.009	0.47	1.00	0.041
Property Damage Only	44.04	0.70	0.25	0.44	0.047	(5) _{TOTAL} -(5) _{FI}	0.240	0.47	4.00	0.446
(PDO)	-11.34	0.78	0.25	0.44	0.247	0.737	0.249	0.47	1.00	0.116

	Worksheet 2F Single-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections										
(1)	(2)	(3)	(4)	(5)	(6)						
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bisv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv (TOTAL)} (crashes/year)						
	from Table 12-13	(9)FI from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E						
Total	1.000	0.041	1.000	0.116	0.157						
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)						
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000						
Collision with animal	0.002	0.000	0.002	0.000	0.000						
Collision with fixed object	0.744	0.031	0.870	0.101	0.132						
Collision with other object	0.072	0.003	0.070	0.008	0.011						
Other single-vehicle collision	0.040	0.002	0.023	0.003	0.004						
Single-vehicle noncollision	0.141	0.006	0.034	0.004	0.010						

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections										
(1)	(1) (2) (3) (4) (5)									
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}					
Clash Severity Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)					
Total										
Fatal and injury (FI)				-						

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections								
(1)	(2)	(3)	(4)						
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF						
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CiviF						
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)						
2.78	1.00	1.00	2.78						

Worksheet 2l Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections										
(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	SPF Coefficients					Overdispersion	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}
Crash Severity Level		from Table 12-14					from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)
	а	b	С	d	е		IIOIII Equation 12-29	(4) HOIH WORKSHEEL ZIT		(4) (3) (0)
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.037	2.78	1.00	0.103
Fatal and Injury (FI)									1.00	0.103

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections										
(1)	(2)	(3)	(4)	(5)	(7)*					
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}					
Crash Severity Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)					
Total	2.425	0.157	2.582	0.015	0.039					
Fatal and injury (FI)					0.039					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

(1)	(2)	(3)	(4)
· · ·	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE		• •
Rear-end collisions (from Worksheet 2D)	0.360	0.785	1.145
Head-on collisions (from Worksheet 2D)	0.039	0.049	0.088
Angle collisions (from Worksheet 2D)	0.277	0.397	0.674
Sideswipe (from Worksheet 2D)	0.079	0.052	0.131
Other multiple-vehicle collision (from Worksheet 2D)	0.044	0.343	0.387
Subtotal	0.799	1.625	2.425
	SINGLE-VEHICLE		
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 2F)	0.031	0.101	0.132
Collision with other object (from Worksheet 2F)	0.003	0.008	0.011
Other single-vehicle collision (from Worksheet 2F)	0.002	0.003	0.004
Single-vehicle noncollision (from Worksheet 2F)	0.006	0.004	0.010
Collision with pedestrian (from Worksheet 2G or 2I)	0.103	0.000	0.103
Collision with bicycle (from Worksheet 2J)	0.039	0.000	0.039
Subtotal	0.184	0.116	0.300
Fotal Control	0.983	1.741	2.724

Worksheet 2L Summary Resu	Worksheet 2L Summary Results for Urban and Suburban Arterial Intersections							
(1)	(2)							
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)							
	(Total) from Worksheet 2K							
Total	2.7							
Fatal and injury (FI)	1.0							
Property damage only (PDO)	1.7							

Crossroad Predictive Crash Analysis Predicted Crash Frequency for the Urban and Suburban Arterials using Chapter 12 of the HSM for the

Preferred Alternative

	Worksheet 2A General Information and Input	Data for Orban and Suburban An	
	al Information		Location Information
Analyst	TL	Roadway	Rockledge Drive
Agency or Company	ATCS	Intersection	Rockledge Dr at Rock Forest Dr
Date Performed	12/07/21	Jurisdiction	Montgomery County
		Analysis Year	2045
	nput Data	Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)	AADT - 07.700 (1/1)		4SG
AADT _{major} (veh/day)	$AADT_{MAX} = 67,700 (veh/day)$		25,785
AADT _{minor} (veh/day)	$AADT_{MAX} = 33,400 (veh/day)$		9,569
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C _i		1.00	1.00
Data for unsignalized intersections only:			
Number of major-road approaches with I	eft-turn lanes (0,1,2)	0	2
Number of major-road approaches with r	ight-turn lanes (0,1,2)	0	1
Data for signalized intersections only:			
Number of approaches with left-turn lane	es (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	4
Number of approaches with right-turn lar	nes (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	3
Number of approaches with left-turn sign	al phasing [for 3SG, use maximum value of 3]		4
Type of left-turn signal phasing for Leg #	1	Permissive	Permissive / Protected
Type of left-turn signal phasing for Leg #	2		Protected
Type of left-turn signal phasing for Leg #	3		Permissive / Protected
Type of left-turn signal phasing for Leg #	4 (if applicable)		Protected
11	-red prohibited [for 3SG, use maximum value of 3]	0	0
Intersection red light cameras (present/n		Not Present	Not Present
Sum of all pedestrian crossing volumes			424
Maximum number of lanes crossed by a	i (idilesk)		6
Number of bus stops within 300 m (1,000	,	0	3
Schools within 300 m (1,000 ft) of the int	1 /	Not Present	Not Present
Number of alcohol sales establishments	within 300 m (1,000 ft) of the intersection	0	0

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(6)	(7)				
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF				
	Phasing									
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}				
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)				
0.66	0.87	0.88	1.00	0.91	1.00	0.46				

		Worksheet 2	2C Multiple	Vehicle Collisions by Sever	ity Level for Urban	and Suburban Arterial II	ntersections			
(1)	(2)		(2)		(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
			Parameter, k	Initial N _{bimv}	Crashes	N _{bimv}	CMFs	Factor, C _i	N _{bimv}	
	fr	om Table 12-1	0	from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)
	а	b	С	IIOIII Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)
Total	-10.99	1.07	0.23	0.39	7.292	1.000	7.292	0.46	1.00	3.358
Fotol and Injury (FI)	-13.14	1.18	0.22	0.33	2.369	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	2.455	0.46	1.00	1.131
Fatal and Injury (FI)	-13.14	1.10	0.22	0.55	2.309	0.337	2.455	0.40	1.00	1.131
Property Damage Only	-11.02	1.02	0.24	0.44	4.667	(5) _{TOTAL} -(5) _{FI}	4.837	0.46	1.00	2.228
(PDO)	-11.02	1.02	0.24	0.44	4.007	0.663	4.037	0.46	1.00	2.220

	Worksheet 2D Multiple-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections										
(1)	(2)	(3)	(4)	(5)	(6)						
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bimv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv (TOTAL)} (crashes/year)						
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C						
Total	1.000	1.131	1.000	2.228	3.358						
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)						
Rear-end collision	0.450	0.509	0.483	1.076	1.585						
Head-on collision	0.049	0.055	0.030	0.067	0.122						
Angle collision	0.347	0.392	0.244	0.544	0.936						
Sideswipe	0.099	0.112	0.032	0.071	0.183						
Other multiple-vehicle collision	0.055	0.062	0.211	0.470	0.532						

		Worksheet	2E Single-\	ehicle Collisions by Severi	ity Level for Urban	and Suburban Arterial In	tersections			
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
	S	PF Coefficien	ts	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
				Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}
Crash Severity Level	fr	om Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)
	а	b	С	from Table 12-12	(FI) from Eqn. 12-		(T)TOTAL (U)	Worksheet 2B		(0) (1) (0)
	а	D	C		24 or 12-27					
Total	-10.21	0.68	0.27	0.36	0.437	1.000	0.437	0.46	1.00	0.201
Fotal and Injury (FI)	-9.25	0.43	0.29	0.09	0.108	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.109	0.46	1.00	0.050
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.100	0.250	0.109	0.46	1.00	0.030
Property Damage Only	44.24	0.70	0.05	0.44	0.224	(5) _{TOTAL} -(5) _{FI}	0.328	0.46	1.00	0.454
(PDO)	-11.34	0.78	0.25	0.44	0.324	0.324 (O)TOTAL (O)FI 0.750		0.46	1.00	0.151

	Worksheet 2F Single-V	ehicle Collisions by Collis	ion Type for Urban and Suburba	n Arterial Intersections		
(1)	(2)	(3)	(4)	(5)	(6)	
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bisv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv (TOTAL)} (crashes/year)	
	from Table 12-13	(9)FI from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E	
Total	1.000	0.050	1.000	0.151	0.201	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000	
Collision with animal	0.002	0.000	0.002	0.000	0.000	
Collision with fixed object	0.744	0.037	0.870	0.131	0.169	
Collision with other object	0.072	0.004	0.070	0.011	0.014	
Other single-vehicle collision	0.040	0.002	0.023	0.003	0.005	
Single-vehicle noncollision	0.141	0.007	0.034	0.005	0.012	

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(1) (2) (3) (4) (5)								
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}				
Clash Severity Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total									
Fatal and injury (FI)				-					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections								
(1)	(2)	(3)	(4)						
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF						
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CiviF						
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)						
4.15	1.00	1.00	4.15						

Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections											
(1)	(2)					(3)	(4)	(5)	(6)	(7)	
Crash Severity Level	SPF Coefficients					Overdispersion	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}	
Crash Seventy Level		fı	om Table 12-1	4		Parameter, k	from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)	
	а	b	С	d	е		Hom Equation 12-29	(4) HOIH WORKSHEEL ZIT		(4) (3) (0)	
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.072	4.15	1.00	0.297	
Fatal and Injury (FI)							1.00	0.297			

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections										
(1)	(2)	(3)	(4)	(5)	(7)*					
crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}					
Crash Severity Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)					
Total	3.358	0.201	3.560	0.015	0.053					
Fatal and injury (FI)		-			0.053					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

(1)	(2)	(3)	(4)
· · · · · · · · · · · · · · · · · · ·	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE		• •
Rear-end collisions (from Worksheet 2D)	0.509	1.076	1.585
Head-on collisions (from Worksheet 2D)	0.055	0.067	0.122
Angle collisions (from Worksheet 2D)	0.392	0.544	0.936
Sideswipe (from Worksheet 2D)	0.112	0.071	0.183
Other multiple-vehicle collision (from Worksheet 2D)	0.062	0.470	0.532
Subtotal	1.131	2.228	3.358
	SINGLE-VEHICLE		
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 2F)	0.037	0.131	0.169
Collision with other object (from Worksheet 2F)	0.004	0.011	0.014
Other single-vehicle collision (from Worksheet 2F)	0.002	0.003	0.005
Single-vehicle noncollision (from Worksheet 2F)	0.007	0.005	0.012
Collision with pedestrian (from Worksheet 2G or 2I)	0.297	0.000	0.297
Collision with bicycle (from Worksheet 2J)	0.053	0.000	0.053
Subtotal	0.401	0.151	0.552
Total	1.532	2.379	3.910

Worksheet 2L Summary Res	sults for Urban and Suburban Arterial Intersections
(1)	(2)
Crash severity level	Predicted average crash frequency, $N_{predicted\ int}$ (crashes/year)
	(Total) from Worksheet 2K
Total	3.9
Fatal and injury (FI)	1.5
Property damage only (PDO)	2.4

Works	neet 2A General Information and Inpu	Data for Urban and Suburban Ar	terial Intersections			
General Informa	tion		Location Information			
Analyst	TL	Roadway	Rockledge Drive			
Agency or Company	ATCS	Intersection	ckledge Dr at I-270 SB Off-Ramp/I-270 SB Ramp Connec			
Date Performed	12/07/21	Jurisdiction	Montgomery County			
		Analysis Year	2045			
Input Data		Base Conditions	Site Conditions			
Intersection type (3ST, 3SG, 4ST, 4SG)			3SG			
AADT _{major} (veh/day)	$AADT_{MAX} = 58,100$ (veh/day)		23,365			
AADT _{minor} (veh/day)	$AADT_{MAX} = 16,400$ (veh/day)		14,652			
Intersection lighting (present/not present)		Not Present	Present			
Calibration factor, C _i		1.00	1.00			
Data for unsignalized intersections only:						
Number of major-road approaches with left-turn land	es (0,1,2)	0	0			
Number of major-road approaches with right-turn lai	nes (0,1,2)	0	1			
Data for signalized intersections only:						
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	0			
Number of approaches with right-turn lanes (0,1,2,3	4) [for 3SG, use maximum value of 3]	0	2			
Number of approaches with left-turn signal phasing	for 3SG, use maximum value of 3]		0			
Type of left-turn signal phasing for Leg #1		Permissive	Not Applicable			
Type of left-turn signal phasing for Leg #2			Not Applicable			
Type of left-turn signal phasing for Leg #3			Permissive			
Type of left-turn signal phasing for Leg #4 (if applica			Not Applicable			
Number of approaches with right-turn-on-red prohib	ted [for 3SG, use maximum value of 3]	0	1			
Intersection red light cameras (present/not present)		Not Present	Not Present			
Sum of all pedestrian crossing volumes (PedVol)	<u> </u>		3			
Maximum number of lanes crossed by a pedestrian	(idilosk)		7			
Number of bus stops within 300 m (1,000 ft) of the in		0	2			
Schools within 300 m (1,000 ft) of the intersection (p		Not Present	Not Present			
Number of alcohol sales establishments within 300	n (1,000 ft) of the intersection	0	0			

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(6)	(7)				
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF				
	Phasing									
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}				
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)				
1.00	1.00	0.92	0.98	0.91	1.00	0.82				

	Worksheet 2C Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections											
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Crash Severity Level	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
-			Parameter, k	Initial N _{bimv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bimv}			
	fr	from Table 12-10		from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from	[(6)*(7)*(8)		
	а	b	С	IIOIII Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)		
Total	-12.13	1.11	0.26	0.33	4.616	1.000	4.616	0.82	1.00	3.797		
Fotal and Injury (FI)	4.1-i(FI)	-11.58 1.02 0	0.17	0.30	.30 1.365	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	1.437	0.82	1.00	1.182		
Fatal and Injury (FI)	-11.50	1.02	0.17	0.30	1.300	0.311	1.437	0.02	1.00	1.102		
Property Damage Only	-13.24	1.14	0.30	0.36	3.019	(5) _{TOTAL} -(5) _{FI}	3.179	0.82	1.00	2.615		
(PDO)	-13.24	1.14	0.30	0.36	3.019	0.689	3.179	0.02	1.00	2.015		

Worksheet 2D Multiple-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(6)				
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bimv} (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv (TOTAL)} (crashes/year)				
	from Table 12-11	(9) _{FI} from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C				
Total	1.000	1.182	1.000	2.615	3.797				
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)				
Rear-end collision	0.549	0.649	0.546	1.428	2.076				
Head-on collision	0.038	0.045	0.020	0.052	0.097				
Angle collision	0.280	0.331	0.204	0.533	0.864				
Sideswipe	0.076	0.090	0.032	0.084	0.173				
Other multiple-vehicle collision	0.057	0.067	0.198	0.518	0.585				

	Worksheet 2E Single-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections										
(1)	(2)			(2) (3)		(5)	(6)	(7)	(8)	(9)	
	S	PF Coefficien	ts	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
				Parameter, k	Initial N _{bisv}	Crashes	N _{bimv}	CMFs	Factor, C _i	N_{bisv}	
Crash Severity Level	fr	om Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)	
		h		from Table 12-12	(FI) from Eqn. 12-		(4)TOTAL (3)	Worksheet 2B	1	(0) (1) (8)	
	а	b	С		24 or 12-27						
Total	-9.02	0.42	0.40	0.36	0.384	1.000	0.384	0.82	1.00	0.315	
Fatal and Injury (FI)	-9.75	0.27	0.51	0.24	0.117	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.123	0.82	1.00	0.101	
i atai and injury (i i)	-9.75	0.27	0.51	0.24	0.117	0.320	0.123	0.02	1.00	0.101	
Property Damage Only	-9.08	0.45	0.33	0.53	0.250	(5) _{TOTAL} -(5) _{FI}	0.261	0.82	1.00	0.215	
(PDO)	-9.00	0.45	0.33	0.55	0.250	0.680	0.201	0.02	1.00	0.213	

(1)	(2)	(3)	ion Type for Urban and Suburba (4)	(5)	(6)
Collision Type	Proportion of Collision Type _(F1)	Predicted N bisv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv (TOTAL)} (crashes/year)
	from Table 12-13	(9) _{FI} from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.101	1.000	0.215	0.315
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.001	0.000	0.003	0.001	0.001
Collision with fixed object	0.653	0.066	0.895	0.192	0.258
Collision with other object	0.091	0.009	0.069	0.015	0.024
Other single-vehicle collision	0.045	0.005	0.018	0.004	0.008
Single-vehicle noncollision	0.209	0.021	0.014	0.003	0.024

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections							
(1)	(1) (2) (3) (4) (5)						
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}		
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)		
Total				-			
Fatal and injury (FI)				-			

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections					
(1)	(2)	(3)	(4)			
CMF for Bus Stops	CMF for Schools	CMF for Schools CMF for Alcohol Sales Establishments				
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CMF			
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)			
2.78	1.00	1.00	2.78			

Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections										
(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	SPF Coefficients				Overdispersion N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}		
Crash Severity Level	from Table 12-14					Parameter, k	from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)
	а	b	С	d	е		nom Equation 12 20	(4) HOIH WORKSHEET ZIT		(4) (0) (0)
Total	-6.60	0.05	0.24	0.41	0.09	0.52	0.006	2.78	1.00	0.017
Fatal and Injury (FI)							-		1.00	0.017

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections							
(1)	(2)	(7)*					
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}		
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)		
Total	3.797	0.315	4.112	0.011	0.045		
Fatal and injury (FI)				-	0.045		

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksr	neet 2K Crash Severity Distribution for Urban a	nd Suburban Arterial Intersections		
(1)	(2)	(3)	(4)	
	Fatal and injury (FI)	Property damage only (PDO)	Total	
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;	
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J	
	MULTIPLE-VEHICLE	·	•	
Rear-end collisions (from Worksheet 2D)	0.649	1.428	2.076	
Head-on collisions (from Worksheet 2D)	0.045	0.052	0.097	
Angle collisions (from Worksheet 2D)	0.331	0.533	0.864	
Sideswipe (from Worksheet 2D)	0.090	0.084	0.173	
Other multiple-vehicle collision (from Worksheet 2D)	0.067	0.518	0.585	
Subtotal	1.182	2.615	3.797	
	SINGLE-VEHICLE			
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000	
Collision with animal (from Worksheet 2F)	0.000	0.001	0.001	
Collision with fixed object (from Worksheet 2F)	0.066	0.192	0.258	
Collision with other object (from Worksheet 2F)	0.009	0.015	0.024	
Other single-vehicle collision (from Worksheet 2F)	0.005	0.004	0.008	
Single-vehicle noncollision (from Worksheet 2F)	0.021	0.003	0.024	
Collision with pedestrian (from Worksheet 2G or 2I)	0.017	0.000	0.017	
Collision with bicycle (from Worksheet 2J)	0.045	0.000	0.045	
Subtotal	0.163	0.215	0.378	
Total	1.345	2.829	4.174	

Worksheet 2L Summary Results for Urban and Suburban Arterial Intersections					
(1)	(2)				
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)				
	(Total) from Worksheet 2K				
Total	4.2				
Fatal and injury (FI)	1.3				
Property damage only (PDO)	2.8				

Works	heet 2A General Information and Inpu	t Data for Urban and Suburban Art	erial Intersections		
General Informa	tion	Location Information			
Analyst	TL	Roadway	Rockledge Drive		
Agency or Company	ATCS	Intersection	ckledge Dr at I-270 SB On-Ramp/I-270 NB Ramp Connec		
Date Performed	12/07/21	Jurisdiction	Montgomery County		
		Analysis Year	2045		
Input Data		Base Conditions	Site Conditions		
Intersection type (3ST, 3SG, 4ST, 4SG)			3SG		
AADT _{major} (veh/day)	$AADT_{MAX} = 58,100 (veh/day)$		30,517		
AADT minor (veh/day)	$AADT_{MAX} = 16,400$ (veh/day)		16,677		
Intersection lighting (present/not present)		Not Present	Present		
Calibration factor, C _i		1.00	1.00		
Data for unsignalized intersections only:					
Number of major-road approaches with left-turn land	es (0,1,2)	0	1		
Number of major-road approaches with right-turn la	nes (0,1,2)	0	0		
Data for signalized intersections only:					
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	2		
Number of approaches with right-turn lanes (0,1,2,3	,4) [for 3SG, use maximum value of 3]	0	0		
Number of approaches with left-turn signal phasing	[for 3SG, use maximum value of 3]		2		
Type of left-turn signal phasing for Leg #1		Permissive	Protected		
Type of left-turn signal phasing for Leg #2			Protected		
Type of left-turn signal phasing for Leg #3			Not Applicable		
Type of left-turn signal phasing for Leg #4 (if applica	ible)		Not Applicable		
Number of approaches with right-turn-on-red prohib	ited [for 3SG, use maximum value of 3]	0	0		
Intersection red light cameras (present/not present)		Not Present	Not Present		
Sum of all pedestrian crossing volumes (PedVol)	Signalized intersections only		6		
Maximum number of lanes crossed by a pedestrian	(n _{lanesx})		5		
Number of bus stops within 300 m (1,000 ft) of the in		0	0		
Schools within 300 m (1,000 ft) of the intersection (p		Not Present	Not Present		
Number of alcohol sales establishments within 300	m (1,000 ft) of the intersection	0	0		

Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF	
	Phasing						
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}	
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)	
0.86	0.88	1.00	1.00	0.91	1.00	0.69	

	Worksheet 2C Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections											
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Crash Severity Level	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
-			Parameter, k	Initial N _{bimv}	Crashes	N _{bimv}	CMFs	Factor, C _i	N_{bimv}			
	from Table 12-10		from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from	Ī	(6)*(7)*(8)			
	а	b	С	IIOIII Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)		
Total	-12.13	1.11	0.26	0.33	6.421	1.000	6.421	0.69	1.00	4.444		
Fotal and Injury (FI)	-11.58	1.02	0.17	0.30	1.832	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	1.932	0.69	1.00	1.337		
Fatal and Injury (FI)	-11.50	1.02	0.17	0.30	1.032	0.301	1.932	0.09	1.00	1.557		
Property Damage Only (PDO)	-13.24	1.14	0.30	0.36	4.256	(5) _{TOTAL} -(5) _{FI} 0.699	4.489	0.69	1.00	3.106		

	Worksheet 2D Multiple-	Vehicle Collisions by Collis	sion Type for Urban and Suburb	an Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bimv} (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv (TOTAL)} (crashes/year)
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C
Total	1.000	1.337	1.000	3.106	4.444
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.549	0.734	0.546	1.696	2.430
Head-on collision	0.038	0.051	0.020	0.062	0.113
Angle collision	0.280	0.374	0.204	0.634	1.008
Sideswipe	0.076	0.102	0.032	0.099	0.201
Other multiple-vehicle collision	0.057	0.076	0.198	0.615	0.691

		Worksheet	2E Single-\	ehicle Collisions by Severi	ty Level for Urban	and Suburban Arterial In	tersections			
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
	S	PF Coefficien	ts	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
			Parameter, k	Initial N _{bisv}	Crashes	N _{bimv}	CMFs	Factor, C _i	N_{bisv}	
Crash Severity Level	fr	rom Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)
	a b c from Table 12	from Table 12-12	(FI) from Eqn. 12-		(4)TOTAL (0)	Worksheet 2B		(0) (1) (0)		
	а	D)		24 or 12-27					
Total	-9.02	0.42	0.40	0.36	0.452	1.000	0.452	0.69	1.00	0.313
Fatal and Injury (FI)	-9.75	0.27	0.51	0.24	0.135	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.142	0.69	1.00	0.098
ratarand injury (FI)	-9.75	0.27	0.51	0.24	0.133	0.315	0.142	0.09	1.00	0.096
Property Damage Only	0.00	0.45	0.22	0.53	0.204	(5) _{TOTAL} -(5) _{FI}	0.240	0.60	1.00	0.044
(PDO)	-9.08	0.45	0.33	0.53	0.294	0.685	0.310	0.69	1.00	0.214

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bisv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv (TOTAL)} (crashes/year)
	from Table 12-13	(9) _{FI} from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.098	1.000	0.214	0.313
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.001	0.000	0.003	0.001	0.001
Collision with fixed object	0.653	0.064	0.895	0.192	0.256
Collision with other object	0.091	0.009	0.069	0.015	0.024
Other single-vehicle collision	0.045	0.004	0.018	0.004	0.008
Single-vehicle noncollision	0.209	0.021	0.014	0.003	0.024

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections								
(1)	(1) (2) (3) (4) (5)							
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}			
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)			
Total				-				
Fatal and injury (FI)				-				

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections								
(1)	(1) (2) (3) (4)								
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF						
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CiviF						
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)						
1.00	1.00	1.00	1.00						

Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections										
(1)		(2)					(4)	(5)	(6)	(7)
Crash Severity Level	SPF Coefficients					Overdispersion	$N_{pedbase}$	Combined CMF	Calibration	Predicted N _{pedi}
Crash Severity Level		from Table 12-14					from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)
	а	b	С	d	е		IIOIII Equation 12-29	(4) Holli Worksheet 2H		(4) (3) (0)
Total	-6.60	0.05	0.24	0.41	0.09	0.52	0.007	1.00	1.00	0.007
Fatal and Injury (FI)									1.00	0.007

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections								
(1)	(1) (2) (3) (4) (5)							
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}			
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)			
Total	4.444	0.313	4.756	0.011	0.052			
Fatal and injury (FI)				1	0.052			

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

WOFKSI	neet 2K Crash Severity Distribution for Urban a	nd Suburban Arterial Intersections	
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE		
Rear-end collisions (from Worksheet 2D)	0.734	1.696	2.430
Head-on collisions (from Worksheet 2D)	0.051	0.062	0.113
Angle collisions (from Worksheet 2D)	0.374	0.634	1.008
Sideswipe (from Worksheet 2D)	0.102	0.099	0.201
Other multiple-vehicle collision (from Worksheet 2D)	0.076	0.615	0.691
Subtotal	1.337	3.106	4.444
	SINGLE-VEHICLE		•
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.001	0.001
Collision with fixed object (from Worksheet 2F)	0.064	0.192	0.256
Collision with other object (from Worksheet 2F)	0.009	0.015	0.024
Other single-vehicle collision (from Worksheet 2F)	0.004	0.004	0.008
Single-vehicle noncollision (from Worksheet 2F)	0.021	0.003	0.024
Collision with pedestrian (from Worksheet 2G or 2I)	0.007	0.000	0.007
Collision with bicycle (from Worksheet 2J)	0.052	0.000	0.052
Subtotal	0.157	0.214	0.372
Total	1.494	3.321	4.815

Worksheet 2L Summary Resul	Worksheet 2L Summary Results for Urban and Suburban Arterial Intersections							
(1)	(2)							
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)							
	(Total) from Worksheet 2K							
Total	4.8							
Fatal and injury (FI)	1.5							
Property damage only (PDO)	3.3							

Works	heet 2A General Information and Inpu	t Data for Urban and Suburban A	rterial Intersec	tions	
General Informa	tion		Locatio	on Information	
Analyst	TL	Roadway		MD 28	
Agency or Company	ATCS	Intersection		MD 28 at Hurley Ave.	
Date Performed	12/07/21	Jurisdiction		Montgomery County	
		Analysis Year	_	2045	
Input Data		Base Conditions		Site Conditions	
Intersection type (3ST, 3SG, 4ST, 4SG)				4SG	
AADT _{major} (veh/day)	$AADT_{MAX} = 67,700 (veh/day)$			57,739	
AADT minor (veh/day)	$AADT_{MAX} = 33,400$ (veh/day)			7,147	
Intersection lighting (present/not present)		Not Present		Present	
Calibration factor, C _i		1.00		1.00	
Data for unsignalized intersections only:					
Number of major-road approaches with left-turn land	0		0		
Number of major-road approaches with right-turn la	nes (0,1,2)	0		0	
Data for signalized intersections only:					
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	2		
Number of approaches with right-turn lanes (0,1,2,3	,4) [for 3SG, use maximum value of 3]	0	2		
Number of approaches with left-turn signal phasing	[for 3SG, use maximum value of 3]		1		
Type of left-turn signal phasing for Leg #1		Permissive		Permissive	
Type of left-turn signal phasing for Leg #2				Protected	
Type of left-turn signal phasing for Leg #3				Permissive	
Type of left-turn signal phasing for Leg #4 (if application)	ble)			Permissive	
Number of approaches with right-turn-on-red prohib	ted [for 3SG, use maximum value of 3]	0		0	
Intersection red light cameras (present/not present)		Not Present		Not Present	
Sum of all pedestrian crossing volumes (PedVol)				108	
Maximum number of lanes crossed by a pedestrian	(laitesk)			7	
Number of bus stops within 300 m (1,000 ft) of the in		0	4		
Schools within 300 m (1,000 ft) of the intersection (p		Not Present	Not Present		
Number of alcohol sales establishments within 300	m (1,000 ft) of the intersection	0		1	

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections								
(1)	(2)	(3)	(4)	(5)	(6)	(7)			
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF			
	Phasing								
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}			
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)			
0.81	1.00	0.92	1.00	0.91	1.00	0.68			

	Worksheet 2C Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections											
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Crash Severity Level	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted			
-				Parameter, k	Initial N _{bimv}	Crashes	N _{bimv}	CMFs	Factor, C _i	N_{bimv}		
	fr	om Table 12-1	0	from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from	(6)*(7)*(8)			
	а	b	С	IIOIII Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)		
Total	-10.99	1.07	0.23	0.39	16.156	1.000	16.156	0.68	1.00	10.978		
Fotal and Injury (FI)	-13.14	1.18	0.22	0.33	5.752	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	5.936	0.68	1.00	4.033		
Fatal and Injury (FI)	-13.14	1.10	0.22	0.33	5.752	0.367	5.936	0.00	1.00	4.033		
Property Damage Only	44.00	4.00	0.04	0.44	0.000	(5) _{TOTAL} -(5) _{FI}	40.000	0.00	4.00	0.044		
(PDO)	-11.02	1.02	0.24	0.44	9.903	0.633	10.220	0.68	1.00	6.944		

	Worksheet 2D Multiple-	Vehicle Collisions by Collis	sion Type for Urban and Suburb	an Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bimv} (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv (TOTAL)} (crashes/year)
	from Table 12-11	(9) _{FI} from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C
Total	1.000	4.033	1.000	6.944	10.978
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.450	1.815	0.483	3.354	5.169
Head-on collision	0.049	0.198	0.030	0.208	0.406
Angle collision	0.347	1.400	0.244	1.694	3.094
Sideswipe	0.099	0.399	0.032	0.222	0.622
Other multiple-vehicle collision	0.055	0.222	0.211	1.465	1.687

		Worksheet	2E Single-\	ehicle Collisions by Severi	ity Level for Urban	and Suburban Arterial In	tersections			
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
			Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}	
Crash Severity Level	fr	om Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from	Ī	(6)*(7)*(8)
		h		from Table 12-12	(FI) from Eqn. 12-		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)
	а	b	С		24 or 12-27					
Total	-10.21	0.68	0.27	0.36	0.699	1.000	0.699	0.68	1.00	0.475
Fotol and Injury (FI)	-9.25	0.43	0.29	0.09	0.141	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.139	0.68	1.00	0.094
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.141	0.199	0.139	0.00	1.00	0.094
Property Damage Only	44.04	0.70	0.05	0.44	0.500	(5) _{TOTAL} -(5) _{FI}	0.500	0.00	4.00	0.000
(PDO)	-11.34	0.78	0.25	0.44	0.566	0.801 0.56		0.68	1.00	0.380

(1)	(2)	(3)	ion Type for Urban and Suburba (4)	(5)	(6)
Collision Type	Proportion of Collision Type(FI)	Predicted N bisv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv (TOTAL)} (crashes/year)
	from Table 12-13	(9) _{FI} from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.094	1.000	0.380	0.475
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.001	0.001
Collision with fixed object	0.744	0.070	0.870	0.331	0.401
Collision with other object	0.072	0.007	0.070	0.027	0.033
Other single-vehicle collision	0.040	0.004	0.023	0.009	0.013
Single-vehicle noncollision	0.141	0.013	0.034	0.013	0.026

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(1) (2) (3) (4) (5)								
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}				
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total				-					
Fatal and injury (FI)				-					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections									
(1)	(2)	(3)	(4)							
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF							
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CMF							
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)							
4.15	1.00	1.12	4.65							

Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections											
(1)	(2)					(3)	(4)	(5)	(6)	(7)	
SPF Coefficients Crash Severity Level					Overdispersion	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}		
Crash Seventy Level		fı	om Table 12-1	4		Parameter, k	from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)	
	а	b	С	d	е		Hom Equation 12-29	(4) HOIH WORKSHEEL ZIT		(4) (3) (0)	
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.039	4.65	1.00	0.179	
Fatal and Injury (FI)							1		1.00	0.179	

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections									
(1)	(2)	(2) (3) (4) (5)							
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}				
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)				
Total	10.978	0.475	11.452	0.015	0.172				
Fatal and injury (FI)				-	0.172				

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksheet 2K Crash Severity Distribution for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)						
	Fatal and injury (FI)	Property damage only (PDO)	Total						
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;						
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J						
	MULTIPLE-VEHICLE	•							
Rear-end collisions (from Worksheet 2D)	1.815	3.354	5.169						
Head-on collisions (from Worksheet 2D)	0.198	0.208	0.406						
Angle collisions (from Worksheet 2D)	1.400	1.694	3.094						
Sideswipe (from Worksheet 2D)	0.399	0.222	0.622						
Other multiple-vehicle collision (from Worksheet 2D)	0.222	1.465	1.687						
Subtotal	4.033	6.944	10.978						
	SINGLE-VEHICLE								
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000						
Collision with animal (from Worksheet 2F)	0.000	0.001	0.001						
Collision with fixed object (from Worksheet 2F)	0.070	0.331	0.401						
Collision with other object (from Worksheet 2F)	0.007	0.027	0.033						
Other single-vehicle collision (from Worksheet 2F)	0.004	0.009	0.013						
Single-vehicle noncollision (from Worksheet 2F)	0.013	0.013	0.026						
Collision with pedestrian (from Worksheet 2G or 2I)	0.179	0.000	0.179						
Collision with bicycle (from Worksheet 2J)	0.172	0.000	0.172						
Subtotal	0.446	0.380	0.826						
Total	4.479	7.324	11.804						

Worksheet 2L Summary Results for Urban and Suburban Arterial Intersections							
(1)	(2)						
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)						
	(Total) from Worksheet 2K						
Total	11.8						
Fatal and injury (FI)	4.5						
Property damage only (PDO)	7.3						

Worksheet	1A General Ir	nformation	and Input Da	ata for Urban and Suburbar	n Roadway	Segments		
General Information			-	Location Information				
Analyst		TL		Roadway		MD 28		
Agency or Company		ATCS		Roadway Section		250 ft east of Hurley Ave. to 250 ft west of I-270 Ramp		
Date Performed		12/07/21		Jurisdiction		Montgomery County		
				Analysis Year		2045		
Input Data				Base Conditions		Site Conditions		
Roadway type (2U, 3T, 4U, 4D, ST)						4D		
Length of segment, L (mi)						0.05		
AADT (veh/day)	$AADT_{MAX} =$	66,000	(veh/day)			55,425		
Type of on-street parking (none/parallel/angle)	•			None	None			
Proportion of curb length with on-street parking						0		
Median width (ft) - for divided only				15		10		
Lighting (present / not present)				Not Present		Present		
Auto speed enforcement (present / not present)				Not Present		Not Present		
Major commercial driveways (number)						0		
Minor commercial driveways (number)						1		
Major industrial / institutional driveways (number)						0		
Minor industrial / institutional driveways (number)						0		
Major residential driveways (number)						0		
Minor residential driveways (number)						0		
Other driveways (number)						0		
Speed Category						Posted Speed Greater than 30 mph		
Roadside fixed object density (fixed objects / mi)				0		360		
Offset to roadside fixed objects (ft) [If greater than 30 or Not Pr	esent, input 30]			30		18		
Calibration Factor, Cr				1.00		1.00		

	Worksheet 1B Crash Modification Factors for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)					
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF					
CMF 1r	CMF 2r	CMF 3r	CMF 4r	CMF 5r	CMF comb					
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)					
1.00	1.75	1.01	0.91	1.00	1.61					

	Worksheet 1C Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments									
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
Crash Severity Level	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
			Parameter, k	Initial N _{brmv}	Crashes	N_{brmv}	CMFs	Factor, Cr	N _{brmv}	
	from Ta	ble 12-3	from Table 12-3	from Equation 12-10		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)	
	а	b	IIOIII Table 12-3	IIOIII Equation 12-10		(4)TOTAL (3)	Worksheet 1B			
Total	-12.34	1.36	1.32	0.618	1.000	0.618	1.61	1.00	0.997	
Fatal and Injury (FI)	-12.76	1.28	1.31	0.170	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.161	1.61	1.00	0.260	
ratai and injury (Fi)	-12.70	1.20	1.51	0.170	0.261	0.101	1.01	1.00	0.200	
D	40.04	4.00	4.04	0.404	(5) _{TOTAL} -(5) _{FI}	0.457	4.04	4.00	0.707	
Property Damage Only (PDO)	-12.81	1.38	1.34	0.481	0.739	0.457	1.61	1.00	0.737	

(1)	(2)	(3)	(4)	(5)	(6)	
Collision Type	Proportion of Collision Type _(FI)	Predicted N brmv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N brmv (PDO) (crashes/year)	Predicted N _{brmv} (TOTAL) (crashes/year)	
	from Table 12-4	(9)FI from Worksheet 1C	from Table 12-4	(9)PDO from Worksheet 1C	(9)TOTAL from Worksheet 1C	
Total	1.000	0.260	1.000	0.737	0.997	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Rear-end collision	0.832	0.216	0.662	0.488	0.704	
lead-on collision	0.020	0.005	0.007	0.005	0.010	
Angle collision	0.040	0.010	0.036	0.027	0.037	
Sideswipe, same direction	0.050	0.013	0.223	0.164	0.177	
ideswipe, opposite direction	0.010	0.003	0.001	0.001	0.003	
Other multiple-vehicle collision	0.048	0.012	0.071	0.052	0.065	

	W	orksheet 1E -	- Single-Vehicle Collisions I	by Severity Level for Urba	an and Suburban Road	way Segments	3		
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
Crash Severity Level			Parameter, k	Initial N _{brsv}	Crashes	N _{brsv}	CMFs	Factor, Cr	N_{brsv}
Clash Seventy Level	from Ta	ble 12-5	from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)
	а	b	Hom rable 12-5	nom Equation 12-13		(4)TOTAL (0)	Worksheet 1B		
Total	-5.05	0.47	0.86	0.054	1.000	0.054	1.61	1.00	0.088
Fatal and Injury (FI)	-8.71	0.66	0.28	0.011	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.011	1.61	1.00	0.018
ratarana injury (i i)	-0.71	0.00	0.20	0.011	0.202	0.011	1.01	1.00	0.010
Property Demoge Only (PDO)	-5.04	0.45	1.06	0.044	(5) _{TOTAL} -(5) _{FI}	0.043	1.61	1.00	0.070
Property Damage Only (PDO)	-5.04	0.45	1.06	0.044	0.798	0.043	1.01	1.00	0.070

	Worksheet 1F Single-Vehi	cle Collisions by Collision	n Type for Urban and Subu	rban Roadway Segments		
(1)	(2)	(3)	(4)	(5)	(6)	
	Proportion of Collision	Predicted N brsv (FI)	Proportion of Collision	Predicted N brsv (PDO)		
	Type _(FI)	(crashes/year)	Type (PDO)	(crashes/year)	Predicted N _{brsv (TOTAL)} (crashes/year)	
Collision Type				(2)		
	from Table 12-6	(9)FI from Worksheet 1E	from Table 12-6	(9)PDO from Worksheet 1E	(9)TOTAL from Worksheet 1E	
Total	1.000	0.018	1.000	0.070	0.088	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Collision with animal	0.001	0.000	0.063	0.004	0.004	
Collision with fixed object	0.500	0.009	0.813	0.057	0.066	
Collision with other object	0.028	0.000	0.016	0.001	0.002	
Other single-vehicle collision	0.471	0.008	0.108	0.008	0.016	

Worksheet	1G Multiple-Vehicle Drive	way-Related Collisions by	y Driveway Type for Urban	and Suburban Roadway Segments		
(1)	(2)	(3)	(4)	(5)	(6)	
Driveway Type	Number of driveways,	Crashes per driveway per year, N _j	Coefficient for traffic adjustment, t	Initial N _{brdwy}	Overdispersion parameter, k	
Driveway Type	n _j	from Table 12-7	from Table 12-7	Equation 12-16	from Table 12-7	
		iloili Table 12-7		n _i * N _i * (AADT/15,000) ^t	IIOIII Table 12-7	
Major commercial	0	0.033	1.106	0.000		
Minor commercial	1	0.011	1.106	0.047		
Major industrial/institutional	0	0.036	1.106	0.000		
Minor industrial/institutional	0	0.005	1.106	0.000		
Major residential	0	0.018	1.106	0.000		
Minor residential	0	0.003	1.106	0.000		
Other	0	0.005	1.106	0.000		
Total				0.047	1.39	

Worksheet 1H Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	
Crash Severity Level	Initial N _{brdwy}	Proportion of total crashes (f _{dwy})	Adjusted N _{brdwy}	Combined CMFs	Calibration factor, C,	Predicted N _{brdwy}	
	(5) _{TOTAL} from Worksheet 1G	from Table 12-7	(2) _{TOTAL} * (3)	(6) from Worksheet 1B		(4)*(5)*(6)	
Total	0.047	1.000	0.047	1.61	1.00	0.075	
Fatal and injury (FI)		0.284	0.013	1.61	1.00	0.021	
Property damage only (PDO)		0.716	0.033	1.61	1.00	0.054	

	Worksheet 1I Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(8)*			
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{pedr}	Predicted N _{pedr}			
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8	(5)*(6)			
Total	0.997	0.088	0.075	1.160	0.019	0.022			
Fatal and injury (FI)						0.022			

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-19

	Worksheet 1J Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(8)*			
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{biker}	Predicted N _{biker}			
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9	(5)*(6)			
Total	0.997	0.088	0.075	1.160	0.005	0.006			
Fatal and injury (FI)						0.006			

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-20

(1)	(2)	(3)	(4)
()	Fatal and injury (FI)	Property damage only (PDO)	Total
N-III-1	(3) from Worksheet 1D and 1F;	(5) from Worksheet 1D and 1F; and	(6) from Worksheet 1D and 1F;
Collision type	(7) from Worksheet 1H; and	(7) from Worksheet 1H	(7) from Worksheet 1H; and
	(8) from Worksheet 1I and 1J	, ,	(8) from Worksheet 1I and 1J
	MULTIPLE-VEHICLE		., ,
Rear-end collisions (from Worksheet 1D)	0.216	0.488	0.704
lead-on collisions (from Worksheet 1D)	0.005	0.005	0.010
ingle collisions (from Worksheet 1D)	0.010	0.027	0.037
Sideswipe, same direction (from Worksheet 1D)	0.013	0.164	0.177
Sideswipe, opposite direction (from Worksheet 1D)	0.003	0.001	0.003
Priveway-related collisions (from Worksheet 1H)	0.021	0.054	0.075
Other multiple-vehicle collision (from Worksheet 1D)	0.012	0.052	0.065
Subtotal	0.281	0.791	1.073
	SINGLE-VEHICLE		
Collision with animal (from Worksheet 1F)	0.000	0.004	0.004
Collision with fixed object (from Worksheet 1F)	0.009	0.057	0.066
Collision with other object (from Worksheet 1F)	0.000	0.001	0.002
Other single-vehicle collision (from Worksheet 1F)	0.008	0.008	0.016
Collision with pedestrian (from Worksheet 1I)	0.022	0.000	0.022
Collision with bicycle (from Worksheet 1J)	0.006	0.000	0.006
Subtotal	0.046	0.070	0.116
otal	0.327	0.861	1.188

Worksheet 1L Summary Results for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)					
Crash Severity Level	Predicted average crash frequency, N predicted rs (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)					
	(Total) from Worksheet 1K		(2) / (3)					
Total	1.2	0.05	23.8					
Fatal and injury (FI)	0.3	0.05	6.5					
Property damage only (PDO)	0.9	0.05	17.2					

Works	heet 2A General Information and Input	t Data for Urban and Suburban A	rterial Intersec	tions
General Informa	tion		Location	on Information
Analyst	TL	Roadway		MD 28
Agency or Company	ATCS	Intersection		MD 28 at SB I-270 Ramp
Date Performed	12/07/21	Jurisdiction		Montgomery County
		Analysis Year		2045
Input Data		Base Conditions	Site Conditions	
Intersection type (3ST, 3SG, 4ST, 4SG)				3SG
AADT _{major} (veh/day)	$AADT_{MAX} = 58,100 (veh/day)$			56,161
AADT minor (veh/day)	$AADT_{MAX} = 16,400$ (veh/day)			8,127
Intersection lighting (present/not present)		Not Present		Present
Calibration factor, C _i		1.00		1.00
Data for unsignalized intersections only:				
Number of major-road approaches with left-turn land	0		0	
Number of major-road approaches with right-turn la	nes (0,1,2)	0		0
Data for signalized intersections only:				
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	1	
Number of approaches with right-turn lanes (0,1,2,3	,4) [for 3SG, use maximum value of 3]	0	2	
Number of approaches with left-turn signal phasing	[for 3SG, use maximum value of 3]		1	
Type of left-turn signal phasing for Leg #1		Permissive		Not Applicable
Type of left-turn signal phasing for Leg #2				Not Applicable
Type of left-turn signal phasing for Leg #3				Protected
Type of left-turn signal phasing for Leg #4 (if applica	ible)			Not Applicable
Number of approaches with right-turn-on-red prohib	ited [for 3SG, use maximum value of 3]	0		0
Intersection red light cameras (present/not present)		Not Present		Not Present
Sum of all pedestrian crossing volumes (PedVol)				82
Maximum number of lanes crossed by a pedestrian	(Idilesk)			6
Number of bus stops within 300 m (1,000 ft) of the in		0		0
Schools within 300 m (1,000 ft) of the intersection (p		Not Present		Not Present
Number of alcohol sales establishments within 300	m (1,000 ft) of the intersection	0		0

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections								
(1)	(2)	(3)	(4)	(5)	(6)	(7)			
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF			
	Phasing								
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}			
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)			
0.93	0.99	0.92	1.00	0.91	1.00	0.77			

	Worksheet 2C Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections											
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Crash Severity Level	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
-			Parameter, k	Initial N _{bimv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bimv}			
	fr	om Table 12-1	0	from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from	Ī	(6)*(7)*(8)		
	а	b	С	Holli Table 12-10	21		(4)TOTAL (3)	Worksheet 2B				
Total	-12.13	1.11	0.26	0.33	10.482	1.000	10.482	0.77	1.00	8.100		
Fotal and Injury (FI)	-11.58	1.02	0.17	0.30	3.020	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	3.199	0.77	1.00	2.472		
Fatal and Injury (FI)	-11.50	1.02	0.17	0.30	3.020	0.305	3.199	0.77	1.00	2.472		
Property Damage Only	40.04	4.44	0.00	0.00	0.075	(5) _{TOTAL} -(5) _{FI}	7.000	0.77	4.00	F 000		
(PDO)	-13.24	1.14	0.30	0.36	6.875	0.695	7.283	0.77	1.00	5.628		

	Worksheet 2D Multiple-	Vehicle Collisions by Collis	sion Type for Urban and Suburb	an Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bimv} (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv} (TOTAL) (crashes/year)
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C
Total	1.000	2.472	1.000	5.628	8.100
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.549	1.357	0.546	3.073	4.430
Head-on collision	0.038	0.094	0.020	0.113	0.207
Angle collision	0.280	0.692	0.204	1.148	1.840
Sideswipe	0.076	0.188	0.032	0.180	0.368
Other multiple-vehicle collision	0.057	0.141	0.198	1.114	1.255

		Worksheet	2E Single-\	ehicle Collisions by Severi	ity Level for Urban	and Suburban Arterial In	tersections			
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
				Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}
Crash Severity Level	fr	om Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)
	а	b	С	from Table 12-12	(FI) from Eqn. 12-		(T)TOTAL (U)	Worksheet 2B		(0) (1) (0)
	а	b	C		24 or 12-27					
Total	-9.02	0.42	0.40	0.36	0.438	1.000	0.438	0.77	1.00	0.338
Fatal and Injury (FI)	-9.75	0.27	0.51	0.24	0.110	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.116	0.77	1.00	0.090
ratarand injury (FI)	-9.75	0.27	0.51	0.24	0.110	0.265	0.110	0.77	1.00	0.090
Property Damage Only	0.00	0.45	0.22	0.53	0.205	(5) _{TOTAL} -(5) _{FI}	0.222	0.77	1.00	0.040
(PDO)	-9.08	0.45	0.33	0.53	0.305	0.735	0.322	0.77		0.249

(1)	(2)	(3)	ion Type for Urban and Suburba (4)	(5)	(6)
Collision Type	Proportion of Collision Type _(F1)	Predicted N bisv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv (TOTAL)} (crashes/year)
	from Table 12-13	(9) _{FI} from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.090	1.000	0.249	0.338
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.001	0.000	0.003	0.001	0.001
Collision with fixed object	0.653	0.059	0.895	0.222	0.281
Collision with other object	0.091	0.008	0.069	0.017	0.025
Other single-vehicle collision	0.045	0.004	0.018	0.004	0.009
Single-vehicle noncollision	0.209	0.019	0.014	0.003	0.022

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(1) (2) (3) (4) (5)								
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}				
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total				-					
Fatal and injury (FI)				-					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections									
(1)	(1) (2) (3) (4)									
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF							
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CMF							
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)							
1.00	1.00	1.00	1.00							

Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections											
(1)	(2)					(3)	(4)	(5)	(6)	(7)	
SPF Coefficients Crash Severity Level					Overdispersion	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}		
Crash Severity Level		fı	om Table 12-1	4		Parameter, k	from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)	
	а	b	С	d	е		IIOIII Equation 12-23	(4) HOIII WORKSHEEL ZIT		(4) (3) (0)	
Total	-6.60	0.05	0.24	0.41	0.09	0.52	0.016	1.00	1.00	0.016	
Fatal and Injury (FI)							1		1.00	0.016	

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections										
(1)	(1) (2) (3) (4) (5)									
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}					
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)					
Total	8.100	0.338	8.439	0.011	0.093					
Fatal and injury (FI)				1	0.093					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksh	neet 2K Crash Severity Distribution for Urban a	nd Suburban Arterial Intersections	
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE	·	
Rear-end collisions (from Worksheet 2D)	1.357	3.073	4.430
Head-on collisions (from Worksheet 2D)	0.094	0.113	0.207
Angle collisions (from Worksheet 2D)	0.692	1.148	1.840
Sideswipe (from Worksheet 2D)	0.188	0.180	0.368
Other multiple-vehicle collision (from Worksheet 2D)	0.141	1.114	1.255
Subtotal	2.472	5.628	8.100
	SINGLE-VEHICLE		•
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.001	0.001
Collision with fixed object (from Worksheet 2F)	0.059	0.222	0.281
Collision with other object (from Worksheet 2F)	0.008	0.017	0.025
Other single-vehicle collision (from Worksheet 2F)	0.004	0.004	0.009
Single-vehicle noncollision (from Worksheet 2F)	0.019	0.003	0.022
Collision with pedestrian (from Worksheet 2G or 2I)	0.016	0.000	0.016
Collision with bicycle (from Worksheet 2J)	0.093	0.000	0.093
Subtotal	0.198	0.249	0.447
Total	2.670	5.877	8.547

Worksheet 2L Summary Results for Urban and Suburban Arterial Intersections							
(1)	(2)						
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)						
	(Total) from Worksheet 2K						
Total	8.5						
Fatal and injury (FI)	2.7						
Property damage only (PDO)	5.9						

Worksheet	1A General lı	nformation	and Input D	ata for Urban and Suburba	n Roadway	Segments	
General Information				Location Information			
Analyst		TL		Roadway		MD 28	
Agency or Company		ATCS		Roadway Section		250 ft east of SB I-270 Ramp to 250 ft west of Nelson St.	
Date Performed		12/07/21		Jurisdiction		Montgomery County	
				Analysis Year		2045	
Input Data				Base Conditions		Site Conditions	
Roadway type (2U, 3T, 4U, 4D, ST)						4D	
Length of segment, L (mi)						0.25	
AADT (veh/day)	$AADT_{MAX} =$	66,000	(veh/day)			32,251	
Type of on-street parking (none/parallel/angle)	•			None		None	
Proportion of curb length with on-street parking						0	
Median width (ft) - for divided only				15		15	
Lighting (present / not present)				Not Present		Present	
Auto speed enforcement (present / not present)				Not Present		Not Present	
Major commercial driveways (number)						0	
Minor commercial driveways (number)						0	
Major industrial / institutional driveways (number)						0	
Minor industrial / institutional driveways (number)						0	
Major residential driveways (number)						0	
Minor residential driveways (number)						0	
Other driveways (number)						0	
Speed Category						Posted Speed Greater than 30 mph	
Roadside fixed object density (fixed objects / mi)			•	0		112	
Offset to roadside fixed objects (ft) [If greater than 30 or Not Pr	esent, input 30]		-	30		11	
Calibration Factor, Cr				1.00		1.00	

	Worksheet 1B Crash Modification Factors for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)				
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF				
CMF 1r	CMF 2r	CMF 3r	CMF 4r	CMF 5r	CMF comb				
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)				
1.00	1.29	1.00	0.91	1.00	1.18				

	Workshee	et 1C Multipl	le-Vehicle Nondriveway Co	ollisions by Severity Level	for Urban and Suburba	n Roadway Se	egments		
(1)	(:	2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
			Parameter, k	Initial N _{brmv}	Crashes	N_{brmv}	CMFs	Factor, Cr	N _{brmv}
	from Ta	ble 12-3	from Table 12-3	from Equation 12-10		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)
	а	b	Holli Table 12-3	IIOIII Equation 12-10		(4)TOTAL (3)	Worksheet 1B		
Total	-12.34	1.36	1.32	1.480	1.000	1.480	1.18	1.00	1.750
Fatal and Injury (FI)	-12.76	1.28	1.31	0.424	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.402	1.18	1.00	0.475
ratai and injury (FI)	-12.70	1.20	1.51	0.424	0.271	0.402	1.10	1.00	0.475
Property Democra Only (BDO)	10.01	4.20	4.24	4.420	(5) _{TOTAL} -(5) _{FI}	4.070	1.10	1.00	4.076
Property Damage Only (PDO)	-12.81	1.38	1.34	1.139	0.729	1.079	1.18	1.00	1.276

Wo	rksheet 1D Multiple-Vehicle No	ndriveway Collisions by (Collision Type for Urban ar	id Suburban Roadway Se	egments
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N brmv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N brmv (PDO) (crashes/year)	Predicted N _{brmv (TOTAL)} (crashes/year)
	from Table 12-4	(9)FI from Worksheet 1C	from Table 12-4	(9)PDO from Worksheet 1C	(9)TOTAL from Worksheet 1C
Total	1.000	0.475	1.000	1.276	1.750
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.832	0.395	0.662	0.844	1.239
Head-on collision	0.020	0.009	0.007	0.009	0.018
Angle collision	0.040	0.019	0.036	0.046	0.065
Sideswipe, same direction	0.050	0.024	0.223	0.284	0.308
Sideswipe, opposite direction	0.010	0.005	0.001	0.001	0.006
Other multiple-vehicle collision	0.048	0.023	0.071	0.091	0.113

	Worksheet 1E Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments									
(1)	(2	2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
Crash Severity Level			Parameter, k	Initial N _{brsv}	Crashes	N _{brsv}	CMFs	Factor, Cr	N_{brsv}	
Orasii Geventy Level	from Ta	ble 12-5	from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)	
	a	b	HOIII TABIC 12-3	Hom Equation 12-13		(T)TOTAL (O)	Worksheet 1B			
Total	-5.05	0.47	0.86	0.211	1.000	0.211	1.18	1.00	0.249	
Fatal and Injury (FI)	-8.71	0.66	0.28	0.039	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.039	1.18	1.00	0.046	
ratarand injury (i i)	-0.71	0.00	0.20	0.009	0.184	0.059	1.10	1.00	0.040	
Preparty Damage Only (PDO)	-5.04	0.45	1.06	0.173	(5) _{TOTAL} -(5) _{FI}	0.172	1.18	1.00	0.203	
Property Damage Only (PDO)	-5.04	0.45	1.00	0.173	0.816	0.172	1.18	1.00	0.203	

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N brsv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N brsv (PDO) (crashes/year)	Predicted N _{brsv (TOTAL)} (crashes/year)
,	from Table 12-6	(9) _{FI} from Worksheet 1E	from Table 12-6	(9)PDO from Worksheet 1E	(9)TOTAL from Worksheet 1E
Total	1.000	0.046	1.000	0.203	0.249
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.001	0.000	0.063	0.013	0.013
Collision with fixed object	0.500	0.023	0.813	0.165	0.188
Collision with other object	0.028	0.001	0.016	0.003	0.005
Other single-vehicle collision	0.471	0.022	0.108	0.022	0.044

Workshee	t 1G Multiple-Vehicle Drive	way-Related Collisions by	y Driveway Type for Urban	and Suburban Roadway Segments		
(1)	(2)	(3)	(4)	(5)	(6)	
Driveway Type	Number of driveways,	Crashes per driveway per year, N _j	Coefficient for traffic adjustment, t	Initial N _{brdwy}	Overdispersion parameter, k	
Driveway Type	n _i	from Table 12-7	from Table 12-7	Equation 12-16	from Table 12-7	
	·	ITOTTI TADIE 12-7	ITOTTI TABLE 12-7	n _j * N _j * (AADT/15,000) ^t	Hom rable 12-7	
Major commercial	0	0.033	1.106	0.000		
Minor commercial	0	0.011	1.106	0.000		
Major industrial/institutional	0	0.036	1.106	0.000		
Minor industrial/institutional	0	0.005	1.106	0.000		
Major residential	0	0.018	1.106	0.000		
Minor residential	0	0.003	1.106	0.000		
Other	0	0.005	1.106	0.000		
Total				0.000	1.39	

Worksheet	Worksheet 1H Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)		
Crash Severity Level	Initial N _{brdwy}	Proportion of total crashes (f _{dwy})	Adjusted N _{brdwy}	Combined CMFs	Calibration factor, C,	Predicted N _{brdwy}		
	(5) _{TOTAL} from Worksheet 1G	(5) _{TOTAL} from Worksheet from Table 12-7		(6) from Worksheet 1B	, ,	(4)*(5)*(6)		
Total	0.000	1.000	0.000	1.18	1.00	0.000		
Fatal and injury (FI)		0.284	0.000	1.18	1.00	0.000		
Property damage only (PDO)		0.716	0.000	1.18	1.00	0.000		

	Worksheet 1I Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(8)*		
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{pedr}	Predicted N _{pedr}		
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8	(5)*(6)		
Total	1.750	0.249	0.000	2.000	0.019	0.038		
Fatal and injury (FI)						0.038		

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-19

	Worksheet 1J Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(8)*		
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{biker}	Predicted N _{biker}		
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9	(5)*(6)		
Total	1.750	0.249	0.000	2.000	0.005	0.010		
Fatal and injury (FI)						0.010		

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-20

(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
N=11!=!=== 4	(3) from Worksheet 1D and 1F;	(5) from Worksheet 1D and 1F; and	(6) from Worksheet 1D and 1F;
Collision type	(7) from Worksheet 1H; and	(7) from Worksheet 1H	(7) from Worksheet 1H; and
	(8) from Worksheet 1I and 1J		(8) from Worksheet 1I and 1J
	MULTIPLE-VEHICLE	•	
Rear-end collisions (from Worksheet 1D)	0.395	0.844	1.239
lead-on collisions (from Worksheet 1D)	0.009	0.009	0.018
ingle collisions (from Worksheet 1D)	0.019	0.046	0.065
Sideswipe, same direction (from Worksheet 1D)	0.024	0.284	0.308
Sideswipe, opposite direction (from Worksheet 1D)	0.005	0.001	0.006
Priveway-related collisions (from Worksheet 1H)	0.000	0.000	0.000
Other multiple-vehicle collision (from Worksheet 1D)	0.023	0.091	0.113
Subtotal	0.475	1.276	1.750
	SINGLE-VEHICLE		
Collision with animal (from Worksheet 1F)	0.000	0.013	0.013
Collision with fixed object (from Worksheet 1F)	0.023	0.165	0.188
Collision with other object (from Worksheet 1F)	0.001	0.003	0.005
Other single-vehicle collision (from Worksheet 1F)	0.022	0.022	0.044
Collision with pedestrian (from Worksheet 1I)	0.038	0.000	0.038
Collision with bicycle (from Worksheet 1J)	0.010	0.000	0.010
Subtotal	0.094	0.203	0.297
otal	0.569	1.479	2.048

Worksheet 1L Summary Results for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)					
Crash Severity Level	Predicted average crash frequency, N predicted rs (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)					
	(Total) from Worksheet 1K		(2) / (3)					
Total	2.0	0.25	8.2					
Fatal and injury (FI)	0.6	0.25	2.3					
Property damage only (PDO)	1.5	0.25	5.9					

Works	heet 2A General Information and Input	t Data for Urban and Suburban A	rterial Intersect	tions
General Informa	tion		Locatio	on Information
Analyst	TL	Roadway		MD 28
Agency or Company	ATCS	Intersection		MD 28 at I-270 Ramp and Nelson St.
Date Performed	12/07/21	Jurisdiction		Montgomery County
		Analysis Year		2045
Input Data		Base Conditions		Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)				4SG
AADT _{major} (veh/day)	$AADT_{MAX} = 67,700 (veh/day)$			26,963
AADT _{minor} (veh/day)	$AADT_{MAX} = 33,400$ (veh/day)			8,529
Intersection lighting (present/not present)		Not Present		Present
Calibration factor, C _i		1.00		1.00
Data for unsignalized intersections only:				
Number of major-road approaches with left-turn land	0		0	
Number of major-road approaches with right-turn la	nes (0,1,2)	0		0
Data for signalized intersections only:				
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]	0		2
Number of approaches with right-turn lanes (0,1,2,3	,4) [for 3SG, use maximum value of 3]	0		2
Number of approaches with left-turn signal phasing	[for 3SG, use maximum value of 3]			2
Type of left-turn signal phasing for Leg #1		Permissive		Permissive / Protected
Type of left-turn signal phasing for Leg #2				Not Applicable
Type of left-turn signal phasing for Leg #3				Not Applicable
Type of left-turn signal phasing for Leg #4 (if application	ble)			Protected
Number of approaches with right-turn-on-red prohib	ited [for 3SG, use maximum value of 3]	0		0
Intersection red light cameras (present/not present)		Not Present		Not Present
Sum of all pedestrian crossing volumes (PedVol)	Signalized intersections only			82
Maximum number of lanes crossed by a pedestrian	(n _{lanesx})			6
Number of bus stops within 300 m (1,000 ft) of the i		0		2
Schools within 300 m (1,000 ft) of the intersection (p		Not Present		Not Present
Number of alcohol sales establishments within 300	m (1,000 ft) of the intersection	0		0

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections								
(1)	(2)	(3)	(4)	(5)	(6)	(7)			
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF			
	Phasing								
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}			
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)			
0.81	0.92	0.92	1.00	0.91	1.00	0.63			

	Worksheet 2C Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections											
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Crash Severity Level	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted			
•				Parameter, k	Initial N _{bimv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bimv}		
	fr	om Table 12-1	0	from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from	1	(6)*(7)*(8)		
	а	b	С	ITOTTI TABLE 12-10	21	(4)TOTAL (Worksheet 2B		(0) (1) (0)		
Total	-10.99	1.07	0.23	0.39	7.450	1.000	7.450	0.63	1.00	4.666		
Estal and Injury (EI)	-13.14	1.18	0.22	0.33	2.435	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	2.524	0.63	1.00	1.581		
Fatal and Injury (FI)	-13.14	1.10	0.22	0.33	2.433	0.339	2.324	0.63	1.00	1.561		
Property Damage Only	44.00	4.00	0.04	0.44	4.750	(5) _{TOTAL} -(5) _{FI}	4.000	0.00	4.00	0.005		
(PDO)	-11.02	1.02	0.24	0.44	4.752	0.661	4.926	0.63	1.00	3.085		

	Worksheet 2D Multiple-	Vehicle Collisions by Collis	sion Type for Urban and Suburb	an Arterial Intersections		
(1)	(2)	(3)	(4)	(5)	(6)	
Collision Type	Proportion of Collision Type _(FI)	· ·		Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv} (TOTAL) (crashes/year)	
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C	
Total	1.000	1.581	1.000	3.085	4.666	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Rear-end collision	0.450	0.711	0.483	1.490	2.201	
Head-on collision	0.049	0.077	0.030	0.093	0.170	
Angle collision	0.347	0.549	0.244	0.753	1.301	
Sideswipe	0.099	0.156	0.032	0.099	0.255	
Other multiple-vehicle collision	0.055	0.087	0.211	0.651	0.738	

		Worksheet	2E Single-\	ehicle Collisions by Severi	ty Level for Urban	and Suburban Arterial In	tersections			
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
				Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}
Crash Severity Level	fr	om Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from	Ī	(6)*(7)*(8)
		b	С	from Table 12-12	(FI) from Eqn. 12-		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)
	а	D	C		24 or 12-27					
Total	-10.21	0.68	0.27	0.36	0.437	1.000	0.437	0.63	1.00	0.273
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.107	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.108	0.63	1.00	0.067
Fatai and injury (Fi)	-9.25	0.43	0.29	0.09	0.107	0.246	0.100	0.03	1.00	0.007
Property Damage Only	44.24	0.70	0.25	0.44	0.226	(5) _{TOTAL} -(5) _{FI}	0.220	0.63	1.00	0.006
(PDO)	-11.34	0.78	0.25	0.44	0.326	0.754	0.329	0.63	1.00	0.206

	Worksheet 2F Single-V	ehicle Collisions by Collis	ion Type for Urban and Suburba	an Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bisv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv (TOTAL)} (crashes/year)
	from Table 12-13	(9) _{FI} from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.067	1.000	0.206	0.273
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.000	0.001
Collision with fixed object	0.744	0.050	0.870	0.179	0.229
Collision with other object	0.072	0.005	0.070	0.014	0.019
Other single-vehicle collision	0.040	0.003	0.023	0.005	0.007
Single-vehicle noncollision	0.141	0.009	0.034	0.007	0.017

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(2)	(3)	(4)	(5)	(7)*				
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}				
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total									
Fatal and injury (FI)				-					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections									
(1)	(1) (2) (3) (4)									
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF							
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CiviF							
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)							
2.78	1.00	1.00	2.78							

Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections											
(1)		(2)					(4)	(5)	(6)	(7)	
Crash Severity Level	SPF Coefficients					Overdispersion	$N_{pedbase}$	Combined CMF	Calibration	Predicted N _{pedi}	
Crash Seventy Level		from Table 12-14					from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)	
	а	b	С	d	е		IIOIII Equation 12-29	(4) HOIH WORKSHEEL ZIT		(4) (3) (0)	
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.033	2.78	1.00	0.091	
Fatal and Injury (FI)									1.00	0.091	

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections									
(1)	(1) (2) (3) (4) (5)								
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}				
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)				
Total	4.666	0.273	4.939	0.015	0.074				
Fatal and injury (FI)				1	0.074				

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksh	ieet 2K Crash Severity Distribution for Urban a	nd Suburban Arterial Intersections	
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE	·	•••
Rear-end collisions (from Worksheet 2D)	0.711	1.490	2.201
Head-on collisions (from Worksheet 2D)	0.077	0.093	0.170
Angle collisions (from Worksheet 2D)	0.549	0.753	1.301
Sideswipe (from Worksheet 2D)	0.156	0.099	0.255
Other multiple-vehicle collision (from Worksheet 2D)	0.087	0.651	0.738
Subtotal	1.581	3.085	4.666
	SINGLE-VEHICLE	·	
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.001
Collision with fixed object (from Worksheet 2F)	0.050	0.179	0.229
Collision with other object (from Worksheet 2F)	0.005	0.014	0.019
Other single-vehicle collision (from Worksheet 2F)	0.003	0.005	0.007
Single-vehicle noncollision (from Worksheet 2F)	0.009	0.007	0.017
Collision with pedestrian (from Worksheet 2G or 2I)	0.091	0.000	0.091
Collision with bicycle (from Worksheet 2J)	0.074	0.000	0.074
Subtotal	0.233	0.206	0.439
Total	1.814	3.291	5.105

Worksheet 2L Summary Resu	Its for Urban and Suburban Arterial Intersections
(1)	(2)
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)
	(Total) from Worksheet 2K
Total	5.1
Fatal and injury (FI)	1.8
Property damage only (PDO)	3.3

Worksheet	1A General In	formation	and Input D	ata for Urban and Suburba	n Roadway	Segments		
General Information			-	Location Information				
Analyst		TL		Roadway		MD 28		
Agency or Company		ATCS		Roadway Section	Section 250 ft east of Nelson St. to 250			
Date Performed	•	12/07/21		Jurisdiction		Montgomery County		
				Analysis Year		2045		
Input Data				Base Conditions		Site Conditions		
Roadway type (2U, 3T, 4U, 4D, ST)	Roadway type (2U, 3T, 4U, 4D, ST)					3T		
Length of segment, L (mi)						0.35		
AADT (veh/day)	AADT _{MAX} =	32,900	(veh/day)			26,103		
Type of on-street parking (none/parallel/angle)				None		None		
Proportion of curb length with on-street parking						0		
Median width (ft) - for divided only				15		Not Present		
Lighting (present / not present)				Not Present		Present		
Auto speed enforcement (present / not present)				Not Present		Present		
Major commercial driveways (number)						0		
Minor commercial driveways (number)						0		
Major industrial / institutional driveways (number)						0		
Minor industrial / institutional driveways (number)						0		
Major residential driveways (number)						4		
Minor residential driveways (number)						35		
Other driveways (number)						0		
Speed Category						Posted Speed Greater than 30 mph		
Roadside fixed object density (fixed objects / mi)				0		163		
Offset to roadside fixed objects (ft) [If greater than 30 or Not Pr	esent, input 30]			30		17		
Calibration Factor, Cr				1.00		1.00		

	Worksheet 1B Crash Modification Factors for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)					
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF					
CMF 1r	CMF 2r	CMF 3r	CMF 4r	CMF 5r	CMF comb					
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)					
1.00	1.31	1.00	0.93	0.95	1.16					

	Workshee	et 1C Multipl	e-Vehicle Nondriveway Co	ollisions by Severity Level	for Urban and Suburba	n Roadway Se	egments		
(1)	(:	2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
			Parameter, k	Initial N _{brmv}	Crashes	N _{brmv}	CMFs	Factor, Cr	N _{brmv}
	from Ta	ble 12-3	from Table 12-3	from Equation 12-10		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)
	а	b	Hom rable 12-3	Hom Equation 12-10		(+)TOTAL (3)	Worksheet 1B		(0) (1) (0)
Total	-12.40	1.41	0.66	2.434	1.000	2.434	1.16	1.00	2.835
Fatal and Injury (FI)	-16.45	1.69	0.59	0.731	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.735	1.16	1.00	0.856
Fatai and injury (Fi)	-10.43	1.09	0.59	0.731	0.302	0.733	1.10	1.00	0.650
Property Democra Only (PDO)	11.05	4.00	0.50	4.000	(5) _{TOTAL} -(5) _{FI}	1 700	1.16	4.00	4.000
Property Damage Only (PDO)	-11.95	1.33	0.59	1.692	0.698	1.700	1.16	1.00	1.980

Worksh	eet 1D Multiple-Vehicle No	ndriveway Collisions by	Collision Type for Urban an	d Suburban Roadway Se	egments
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N brmv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N _{brmv} (PDO) (crashes/year)	Predicted N _{brmv (TOTAL)} (crashes/year)
	from Table 12-4	(9) _{FI} from Worksheet 1C	from Table 12-4	(9)PDO from Worksheet 1C	(9)TOTAL from Worksheet 1C
Total	1.000	0.856	1.000	1.980	2.835
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.845	0.723	0.842	1.667	2.390
Head-on collision	0.034	0.029	0.020	0.040	0.069
Angle collision	0.069	0.059	0.020	0.040	0.099
Sideswipe, same direction	0.001	0.001	0.078	0.154	0.155
Sideswipe, opposite direction	0.017	0.015	0.020	0.040	0.054
Other multiple-vehicle collision	0.034	0.029	0.020	0.040	0.069

	Worksheet 1E Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments									
(1)	(2	2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
Crash Severity Level			Parameter, k	Initial N _{brsv}	Crashes	N_{brsv}	CMFs	Factor, Cr	N _{brsv}	
Crash Seventy Level	from Ta	ble 12-5	from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)	
	а	b	Hom rable 12 0	nom Equation 12 10		(· / IOTAL (· /	Worksheet 1B		(0) (1) (0)	
Total	-5.74	0.54	1.37	0.273	1.000	0.273	1.16	1.00	0.318	
Fatal and Injury (FI)	-6.37	0.47	1.06	0.071	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.074	1.16	1.00	0.086	
- atai and injury (i i)	-0.57	0.47	1.00	0.07 1	0.270	0.074	1.10	1.00	0.000	
Property Damage Only (PDO)	-6.29	0.56	1.93	0.193	(5) _{TOTAL} -(5) _{FI}	0.199	1.16	1.00	0.232	
Froperty Damage Only (PDO)	-0.29	0.50	1.93	0.193	0.730	0.199	1.10	1.00	0.232	

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N brsv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N brsv (PDO) (crashes/year)	Predicted N _{brsv (TOTAL)} (crashes/year)
	from Table 12-6	(9) _{FI} from Worksheet 1E	from Table 12-6	(9)PDO from Worksheet 1E	(9)TOTAL from Worksheet 1E
Total	1.000	0.086	1.000	0.232	0.318
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.001	0.000	0.001	0.000	0.000
Collision with fixed object	0.688	0.059	0.963	0.224	0.283
Collision with other object	0.001	0.000	0.001	0.000	0.000
Other single-vehicle collision	0.310	0.027	0.035	0.008	0.035

Works	sheet 1G Multiple-Vehicle Drive	way-Related Collisions by	y Driveway Type for Urban	and Suburban Roadway Segments	
(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	Number of driveways,	Crashes per driveway per year, N _j	Coefficient for traffic adjustment, t	Initial N _{brdwy}	Overdispersion parameter, k
	n _j	from Table 12-7	from Table 12-7	Equation 12-16	from Table 12-7
		Holli Table 12-7	HOIII TABLE 12-7	n _j * N _j * (AADT/15,000) ^t	IIOIII Table 12-7
Major commercial	0	0.102	1.000	0.000	
Minor commercial	0	0.032	1.000	0.000	
Major industrial/institutional	0	0.110	1.000	0.000	
Minor industrial/institutional	0	0.015	1.000	0.000	
Major residential	4	0.053	1.000	0.369	
Minor residential	35	0.010	1.000	0.609	
Other	0	0.016	1.000	0.000	
Total				0.978	1.10

Worksheet 1H Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(7)		
Crash Severity Level	Initial N _{brdwy}	Proportion of total crashes (f _{dwy})	Adjusted N _{brdwy}	Combined CMFs	Calibration factor, C,	Predicted N _{brdwy}		
	(5) _{TOTAL} from Worksheet 1G	from Table 12-7	(2) _{TOTAL} * (3)	(6) from Worksheet 1B	, ·	(4)*(5)*(6)		
Total	0.978	1.000	0.978	1.16	1.00	1.139		
Fatal and injury (FI)		0.243	0.238	1.16	1.00	0.277		
Property damage only (PDO)		0.757	0.740	1.16	1.00	0.862		

	Worksheet 1I Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(8)*		
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{pedr}	Predicted N _{pedr}		
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8	(5)*(6)		
Total	2.835	0.318	1.139	4.292	0.013	0.056		
Fatal and injury (FI)						0.056		

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-19

	Worksheet 1J Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(8)*		
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{biker}	Predicted N _{biker}		
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9	(5)*(6)		
Total	2.835	0.318	1.139	4.292	0.007	0.030		
Fatal and injury (FI)						0.030		

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-20

(1)	(2)	(3)	(4)
\ /	Fatal and injury (FI)	Property damage only (PDO)	Total
N=11!=!=== 4	(3) from Worksheet 1D and 1F;	(5) from Worksheet 1D and 1F; and	(6) from Worksheet 1D and 1F;
Collision type	(7) from Worksheet 1H; and	(7) from Worksheet 1H	(7) from Worksheet 1H; and
	(8) from Worksheet 1I and 1J		(8) from Worksheet 1I and 1J
	MULTIPLE-VEHICLE	•	
Rear-end collisions (from Worksheet 1D)	0.723	1.667	2.390
lead-on collisions (from Worksheet 1D)	0.029	0.040	0.069
ingle collisions (from Worksheet 1D)	0.059	0.040	0.099
Sideswipe, same direction (from Worksheet 1D)	0.001	0.154	0.155
Sideswipe, opposite direction (from Worksheet 1D)	0.015	0.040	0.054
Priveway-related collisions (from Worksheet 1H)	0.277	0.862	1.139
Other multiple-vehicle collision (from Worksheet 1D)	0.029	0.040	0.069
Subtotal	1.132	2.842	3.974
	SINGLE-VEHICLE		
Collision with animal (from Worksheet 1F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 1F)	0.059	0.224	0.283
Collision with other object (from Worksheet 1F)	0.000	0.000	0.000
Other single-vehicle collision (from Worksheet 1F)	0.027	0.008	0.035
Collision with pedestrian (from Worksheet 1I)	0.056	0.000	0.056
Collision with bicycle (from Worksheet 1J)	0.030	0.000	0.030
Subtotal	0.172	0.232	0.404
otal	1.304	3.074	4.378

Worksheet 1L Summary Results for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)				
Crash Severity Level	Predicted average crash frequency, N predicted rs (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)				
	(Total) from Worksheet 1K		(2) / (3)				
Total	4.4	0.35	12.5				
Fatal and injury (FI)	1.3	0.35	3.7				
Property damage only (PDO)	3.1	0.35	8.8				

Camaral	Worksheet 2A General Information and Input Information	Data for Orban and Suburban An	
			Location Information
Analyst	TL	Roadway	MD 28
Agency or Company	ATCS	Intersection	MD 28 at Laird St.
Date Performed	12/07/21	Jurisdiction	Montgomery County
		Analysis Year	2045
· ·	ut Data	Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)			4SG
AADT _{major} (veh/day)	$AADT_{MAX} = 67,700 (veh/day)$		27,239
AADT _{minor} (veh/day)	$AADT_{MAX} = 33,400 (veh/day)$	-	1,249
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C _i		1.00	1.00
Data for unsignalized intersections only:			
Number of major-road approaches with left	-turn lanes (0,1,2)	0	0
Number of major-road approaches with righ	nt-turn lanes (0,1,2)	0	0
Data for signalized intersections only:			
Number of approaches with left-turn lanes	(0,1,2,3,4) [for 3SG, use maximum value of 3]	0	2
Number of approaches with right-turn lanes	s (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	1
Number of approaches with left-turn signal	phasing [for 3SG, use maximum value of 3]		0
Type of left-turn signal phasing for Leg #1		Permissive	Permissive
Type of left-turn signal phasing for Leg #2			Permissive
Type of left-turn signal phasing for Leg #3			Permissive
Type of left-turn signal phasing for Leg #4 (if applicable)		Permissive
	ed prohibited [for 3SG, use maximum value of 3]	0	0
Intersection red light cameras (present/not	present)	Not Present	Not Present
Sum of all pedestrian crossing volumes (P	edVol) Signalized intersections only		240
Maximum number of lanes crossed by a pe	edestrian (n _{lanesx})		3
Number of bus stops within 300 m (1,000 ft	,	0	4
Schools within 300 m (1,000 ft) of the inters	\1 /	Not Present	Present
Number of alcohol sales establishments with	thin 300 m (1.000 ft) of the intersection	0	0

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections							
(1)	(2)	(3)	(4)	(5)	(6)	(7)		
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF		
	Phasing							
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}		
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)		
0.81	1.00	0.96	1.00	0.91	1.00	0.71		

	Worksheet 2C Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections											
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Crash Severity Level	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
			Parameter, k	Initial N _{bimv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bimv}			
	fr	om Table 12-1	0	from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from	(6)*(7)*(8)			
	а	b	С	Holli Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)		
Total	-10.99	1.07	0.23	0.39	4.841	1.000	4.841	0.71	1.00	3.428		
Fotal and Injury (FI)	-13.14	1.18	0.22	0.33	1.615	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	1.684	0.71	1.00	1.193		
Fatal and Injury (FI)	-13.14	1.10	0.22	0.33	1.015	0.348	1.004	0.71	1.00	1.193		
Property Damage Only	44.00	4.00	0.04	0.44	0.000	(5) _{TOTAL} -(5) _{FI}	0.457	0.74	4.00	0.000		
(PDO)	-11.02	1.02	0.24	0.44	3.028	0.652	3.157	0.71	1.00	2.236		

	Worksheet 2D Multiple-	Vehicle Collisions by Collis	sion Type for Urban and Suburb	an Arterial Intersections		
(1)	(2)	(3)	(4)	(5)	(6)	
Collision Type	Proportion of Collision Type _(FI)	· ·		Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv (TOTAL)} (crashes/year)	
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C	
Total	1.000	1.193	1.000	2.236	3.428	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Rear-end collision	0.450	0.537	0.483	1.080	1.617	
Head-on collision	0.049	0.058	0.030	0.067	0.126	
Angle collision	0.347	0.414	0.244	0.546	0.959	
Sideswipe	0.099	0.118	0.032	0.072	0.190	
Other multiple-vehicle collision	0.055	0.066	0.211	0.472	0.537	

		Worksheet	2E Single-V	ehicle Collisions by Severi	ty Level for Urban	and Suburban Arterial In	tersections			•
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
			Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}	
Crash Severity Level	fr	om Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from	Ī	(6)*(7)*(8)
		b	С	from Table 12-12	(FI) from Eqn. 12-		(4)TOTAL (3)	Worksheet 2B	<u>i</u>	(0) (1) (0)
	а	D	C		24 or 12-27					
Total	-10.21	0.68	0.27	0.36	0.262	1.000	0.262	0.71	1.00	0.185
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.061	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.061	0.71	1.00	0.043
Fatai and injury (Fi)	-9.25	0.43	0.29	0.09	0.001	0.232	0.001	0.71	1.00	0.043
Property Damage Only	44.24	0.70	0.25	0.44	(5) _{TOTAL} -(5) _{FI}		0.004	0.74	4.00	0.440
(PDO)	-11.34	0.78	0.25	0.44	0.204	0.768	0.201	0.71	1.00	0.142

	Worksheet 2F Single-V	ehicle Collisions by Collis	ion Type for Urban and Suburba	n Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bisv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv (TOTAL)} (crashes/year)
	from Table 12-13	(9)FI from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.043	1.000	0.142	0.185
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.000	0.000
Collision with fixed object	0.744	0.032	0.870	0.124	0.156
Collision with other object	0.072	0.003	0.070	0.010	0.013
Other single-vehicle collision	0.040	0.002	0.023	0.003	0.005
Single-vehicle noncollision	0.141	0.006	0.034	0.005	0.011

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(1) (2) (3) (4) (5)								
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}				
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total									
Fatal and injury (FI)				-					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections									
(1)	(1) (2) (3)									
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF							
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CiviF							
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)							
4.15	1.35	1.00	5.60							

Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections										
(1)		(2)					(4)	(5)	(6)	(7)
Crash Severity Level	SPF Coefficients					Overdispersion	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}
Crash Severity Level		from Table 12-14					from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)
	а	b	С	d	е		IIOIII Equation 12-29	(4) IIOIII WOIKSHEEL ZII		(4) (3) (0)
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.026	5.60	1.00	0.147
Fatal and Injury (FI)									1.00	0.147

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections									
(1)	(2)	(2) (3) (4) (5)							
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}				
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)				
Total	3.428	0.185	3.614	0.015	0.054				
Fatal and injury (FI)		-			0.054				

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksheet 2K Crash Severity Distribution for Urban and Suburban Arterial Intersections								
(1)	(2)	(3)	(4)					
	Fatal and injury (FI)	Property damage only (PDO)	Total					
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;					
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J					
	MULTIPLE-VEHICLE	•						
Rear-end collisions (from Worksheet 2D)	0.537	1.080	1.617					
Head-on collisions (from Worksheet 2D)	0.058	0.067	0.126					
Angle collisions (from Worksheet 2D)	0.414	0.546	0.959					
Sideswipe (from Worksheet 2D)	0.118	0.072	0.190					
Other multiple-vehicle collision (from Worksheet 2D)	0.066	0.472	0.537					
Subtotal	1.193	2.236	3.428					
	SINGLE-VEHICLE							
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000					
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000					
Collision with fixed object (from Worksheet 2F)	0.032	0.124	0.156					
Collision with other object (from Worksheet 2F)	0.003	0.010	0.013					
Other single-vehicle collision (from Worksheet 2F)	0.002	0.003	0.005					
Single-vehicle noncollision (from Worksheet 2F)	0.006	0.005	0.011					
Collision with pedestrian (from Worksheet 2G or 2I)	0.147	0.000	0.147					
Collision with bicycle (from Worksheet 2J)	0.054	0.000	0.054					
Subtotal	0.244	0.142	0.386					
Total	1.436	2.378	3.815					

Worksheet 2L Summary Results for Urban and Suburban Arterial Intersections							
(1)	(2)						
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)						
	(Total) from Worksheet 2K						
Total	3.8						
Fatal and injury (FI)	1.4						
Property damage only (PDO)	2.4						

Worksheet	1A General In	formation	and Input Da	ata for Urban and Suburbar	n Roadway	Segments
General Information			-			Location Information
Analyst		TL		Roadway		MD 117 W Diamond Ave
Agency or Company		ATCS		Roadway Section		I-270 SB On-Ramp to I-270 NB Off-Ramp
Date Performed		12/07/21		Jurisdiction		Montgomery County
				Analysis Year		2045
Input Data	Input Data					Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)						4U
Length of segment, L (mi)						0.09
AADT (veh/day)	$AADT_{MAX} =$	40,100	(veh/day)			39,304
Type of on-street parking (none/parallel/angle)				None		None
Proportion of curb length with on-street parking						0
Median width (ft) - for divided only				15		Not Present
Lighting (present / not present)				Not Present		Not Present
Auto speed enforcement (present / not present)				Not Present		Not Present
Major commercial driveways (number)						0
Minor commercial driveways (number)						0
Major industrial / institutional driveways (number)						0
Minor industrial / institutional driveways (number)						0
Major residential driveways (number)						0
Minor residential driveways (number)						0
Other driveways (number)						0
Speed Category						Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)				0		67
Offset to roadside fixed objects (ft) [If greater than 30 or Not Pr	esent, input 30]			30		10
Calibration Factor, Cr	-			1.00		1.00

	Worksheet 1B Crash Modification Factors for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)				
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF				
CMF 1r	CMF 2r	CMF 3r	CMF 4r	CMF 5r	CMF comb				
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)				
1.00	1.18	1.00	1.00	1.00	1.18				

(1)			e-Vehicle Nondriveway Co	onisions by Severity Level	TOT UTDAN AND SUBURDA		egments	(8)	(0)
Crash Severity Level	,	2) efficients	(3) Overdispersion Parameter, k	Initial N _{brmv}	Proportion of Total Crashes	(6) Adjusted N _{brmv}	Combined CMFs	Calibration Factor, Cr	(9) Predicted N _{brmv}
	from Ta a	ble 12-3 b	from Table 12-3	from Equation 12-10		(4) _{TOTAL} *(5)	(6) from Worksheet 1B	·	(6)*(7)*(8)
Total	-11.63	1.33	1.01	1.033	1.000	1.033	1.18	1.00	1.215
Fatal and Injury (FI)	-12.08	1.25	0.99	0.282	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.284	0.293	1.18	1.00	0.345
Property Damage Only (PDO)	-12.53	1.38	1.08	0.713	(5) _{TOTAL} -(5) _{FI} 0.716	0.740	1.18	1.00	0.870

(1)	orksheet 1D Multiple-Vehicle No (2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{brmv} (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N brmv (PDO) (crashes/year)	Predicted N _{brmv (TOTAL)} (crashes/year)
	from Table 12-4	(9)FI from Worksheet 1C	from Table 12-4	(9)PDO from Worksheet 1C	(9)TOTAL from Worksheet 1C
Total	1.000	0.345	1.000	0.870	1.215
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.511	0.176	0.506	0.440	0.617
Head-on collision	0.077	0.027	0.004	0.003	0.030
Angle collision	0.181	0.062	0.130	0.113	0.176
Sideswipe, same direction	0.093	0.032	0.249	0.217	0.249
Sideswipe, opposite direction	0.082	0.028	0.031	0.027	0.055
Other multiple-vehicle collision	0.056	0.019	0.080	0.070	0.089

	W	orksheet 1E -	- Single-Vehicle Collisions I	by Severity Level for Urba	an and Suburban Road	vay Segments	;		
(1)	(2	2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
Crash Severity Level			Parameter, k	Initial N _{brsv}	Crashes	N_{brsv}	CMFs	Factor, Cr	N _{brsv}
Clash Seventy Level	from Ta	ble 12-5	from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)
	a	b	Irom Table 12-5	Hom Equation 12-15		(T)TOTAL (O)	Worksheet 1B		
Total	-7.99	0.81	0.91	0.161	1.000	0.161	1.18	1.00	0.189
Fatal and Injury (FI)	-7.37	0.61	0.54	0.036	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.034	1.18	1.00	0.040
ratarana mjary (r i)	-1.51	0.01	0.54	0.030	0.214	0.004	1.10	1.00	0.040
Property Demoge Only (PDO)	-8.50	0.84	0.97	0.132	(5) _{TOTAL} -(5) _{FI}	0.126	1.18	1.00	0.149
Property Damage Only (PDO)	-0.50	0.04	0.97	0.132	0.786	0.120	1.10	1.00	0.149

	Worksheet 1F Single-Vehic	cle Collisions by Collision	Type for Urban and Subu	rban Roadway Segments	
(1)	(2)	(3)	(4)	(5)	(6)
	Proportion of Collision	Predicted N brsv (FI)	Proportion of Collision	Predicted N brsv (PDO)	
	Type(FI)	(crashes/year)	Type (PDO)	(crashes/year)	Predicted N _{brsv} (TOTAL) (crashes/year)
Collision Type			22 (1,		
	from Table 12-6	(9)FI from Worksheet 1E	from Table 12-6	(9)PDO from Worksheet	(9)TOTAL from Worksheet 1E
	IIOIII Table 12-0	(9)FI HOITI WORKSHEEL IE	IIOIII Table 12-0	1E	(9) TOTAL HOTH WORKSHEEL TE
Total	1.000	0.040	1.000	0.149	0.189
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.001	0.000	0.001	0.000	0.000
Collision with fixed object	0.612	0.025	0.809	0.120	0.145
Collision with other object	0.020	0.001	0.029	0.004	0.005
Other single-vehicle collision	0.367	0.015	0.161	0.024	0.039

Work	sheet 1G Multiple-Vehicle Drive	way-Related Collisions by	y Driveway Type for Urban	and Suburban Roadway Segments	
(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	Number of driveways,	Crashes per driveway per year, N _j	Coefficient for traffic adjustment, t	Initial N _{brdwy}	Overdispersion parameter, k
	n _j	from Table 12-7	from Table 12-7	Equation 12-16	from Table 12-7
		Hom rable 12-7		n _j * N _j * (AADT/15,000) ^t	IIOIII Table 12-7
Major commercial	0	0.182	1.172	0.000	
Minor commercial	0	0.058	1.172	0.000	
Major industrial/institutional	0	0.198	1.172	0.000	
Minor industrial/institutional	0	0.026	1.172	0.000	
Major residential	0	0.096	1.172	0.000	
Minor residential	0	0.018	1.172	0.000	
Other	0	0.029	1.172	0.000	
Total				0.000	0.81

Worksheet 1H Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(7)		
Crash Severity Level	Initial N _{brdwy}	Proportion of total crashes (f _{dwy})	Adjusted N _{brdwy}	Combined CMFs	Calibration factor, C,	Predicted N _{brdwy}		
	(5) _{TOTAL} from Worksheet 1G	from Table 12-7	(2) _{TOTAL} * (3)	(6) from Worksheet 1B	, ,	(4)*(5)*(6)		
Total	0.000	1.000	0.000	1.18	1.00	0.000		
Fatal and injury (FI)		0.342	0.000	1.18	1.00	0.000		
Property damage only (PDO)		0.658	0.000	1.18	1.00	0.000		

	Worksheet 1I Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(8)*			
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{pedr}	Predicted N _{pedr}			
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8	(5)*(6)			
Гotal	1.215	0.189	0.000	1.405	0.009	0.013			
atal and injury (FI)						0.013			

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-19

	Worksheet 1J Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(8)*			
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{biker}	Predicted N _{biker}			
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9	(5)*(6)			
Total	1.215	0.189	0.000	1.405	0.002	0.003			
Fatal and injury (FI)						0.003			

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-20

(1)	(2)	(3)	(4)
\ /	Fatal and injury (FI)	Property damage only (PDO)	Total
Na 111-1 4	(3) from Worksheet 1D and 1F;	(5) from Worksheet 1D and 1F; and	(6) from Worksheet 1D and 1F;
Collision type	(7) from Worksheet 1H; and	(7) from Worksheet 1H	(7) from Worksheet 1H; and
	(8) from Worksheet 1I and 1J		(8) from Worksheet 1I and 1J
	MULTIPLE-VEHICLE	•	
Rear-end collisions (from Worksheet 1D)	0.176	0.440	0.617
Head-on collisions (from Worksheet 1D)	0.027	0.003	0.030
Angle collisions (from Worksheet 1D)	0.062	0.113	0.176
Sideswipe, same direction (from Worksheet 1D)	0.032	0.217	0.249
Sideswipe, opposite direction (from Worksheet 1D)	0.028	0.027	0.055
Oriveway-related collisions (from Worksheet 1H)	0.000	0.000	0.000
Other multiple-vehicle collision (from Worksheet 1D)	0.019	0.070	0.089
Subtotal	0.345	0.870	1.215
	SINGLE-VEHICLE		
Collision with animal (from Worksheet 1F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 1F)	0.025	0.120	0.145
Collision with other object (from Worksheet 1F)	0.001	0.004	0.005
Other single-vehicle collision (from Worksheet 1F)	0.015	0.024	0.039
Collision with pedestrian (from Worksheet 1I)	0.013	0.000	0.013
Collision with bicycle (from Worksheet 1J)	0.003	0.000	0.003
Subtotal	0.056	0.149	0.204
- Fotal	0.401	1.019	1.420

Worksheet 1L Summary Results for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)					
Crash Severity Level	Predicted average crash frequency, N predicted rs (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)					
	(Total) from Worksheet 1K		(2) / (3)					
Total	1.4	0.09	15.8					
Fatal and injury (FI)	0.4	0.09	4.5					
Property damage only (PDO)	1.0	0.09	11.3					

	Worksheet 2A General Information and Input	Data for Orban and Suburban Ar	
	formation		Location Information
Analyst	TL	Roadway	MD 189 (Falls Road)
Agency or Company	ATCS	Intersection	MD 189 at Wootton Pkwy
Date Performed	12/07/21	Jurisdiction	Montgomery County
	_	Analysis Year	2045
Input	Data	Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)	AADT		4SG
AADT _{major} (veh/day)	$AADT_{MAX} = 67,700 (veh/day)$		24,079
AADT _{minor} (veh/day)	$AADT_{MAX} = 33,400 (veh/day)$	-	18,293
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C _i		1.00	1.00
Data for unsignalized intersections only:			
Number of major-road approaches with left-tu	ırn lanes (0,1,2)	0	0
Number of major-road approaches with right-	turn lanes (0,1,2)	0	0
Data for signalized intersections only:			
Number of approaches with left-turn lanes (0	1,2,3,4) [for 3SG, use maximum value of 3]	0	4
Number of approaches with right-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	3
Number of approaches with left-turn signal pl	nasing [for 3SG, use maximum value of 3]		4
Type of left-turn signal phasing for Leg #1		Permissive	Protected
Type of left-turn signal phasing for Leg #2			Protected
Type of left-turn signal phasing for Leg #3			Permissive / Protected
Type of left-turn signal phasing for Leg #4 (if	applicable)		Permissive / Protected
Number of approaches with right-turn-on-red	prohibited [for 3SG, use maximum value of 3]	0	0
Intersection red light cameras (present/not pr		Not Present	Not Present
Sum of all pedestrian crossing volumes (Ped	IVol) Signalized intersections only		120
Maximum number of lanes crossed by a pede	estrian (n _{lanesx})		7
Number of bus stops within 300 m (1,000 ft)	of the intersection	0	10
Schools within 300 m (1,000 ft) of the interse	\1 /	Not Present	Not Present
Number of alcohol sales establishments with	n 300 m (1,000 ft) of the intersection	0	0

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections								
(1)	(2)	(3)	(4)	(5)	(6)	(7)			
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF			
	Phasing								
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}			
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)			
0.66	0.87	0.88	1.00	0.91	1.00	0.46			

	Worksheet 2C Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections											
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Crash Severity Level	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
			Parameter, k	Initial N _{bimv}	Crashes	N _{bimv}	CMFs	Factor, C _i	N_{bimv}			
	fr	om Table 12-1	0	from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from	Ī	(6)*(7)*(8)		
	а	b	С	Holli Table 12-10	21		(4)TOTAL (3)	Worksheet 2B	(0) (1)	(0) (1) (0)		
Total	-10.99	1.07	0.23	0.39	7.867	1.000	7.867	0.46	1.00	3.623		
Fotal and Injury (FI)	-13.14	1.18	0.22	0.33	0.500	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	2.607	0.46	1.00	1.200		
Fatal and Injury (FI)	-13.14	1.10	0.22	0.33	2.520	0.331	2.007	0.46	1.00	1.200		
Property Damage Only	44.00	4.00	0.04	0.44	E 00E	(5) _{TOTAL} -(5) _{FI}	5.000	0.40	4.00	0.400		
(PDO)	-11.02	1.02	0.24	0.44	5.085	0.669	5.260	0.46	1.00	2.422		

	Worksheet 2D Multiple-	Vehicle Collisions by Collis	sion Type for Urban and Suburb	an Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N bimv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv (TOTAL)} (crashes/year)
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C
Total	1.000	1.200	1.000	2.422	3.623
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.450	0.540	0.483	1.170	1.710
Head-on collision	0.049	0.059	0.030	0.073	0.131
Angle collision	0.347	0.417	0.244	0.591	1.008
Sideswipe	0.099	0.119	0.032	0.078	0.196
Other multiple-vehicle collision	0.055	0.066	0.211	0.511	0.577

		Worksheet	2E Single-\	ehicle Collisions by Severi	ity Level for Urban	and Suburban Arterial In	tersections			
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
			Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}	
Crash Severity Level	fr	om Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from	Ī	(6)*(7)*(8)
		b	С	from Table 12-12	(FI) from Eqn. 12-		(4)TOTAL (3)	Worksheet 2B	1	(0) (1) (0)
	а	b	C		24 or 12-27					
Total	-10.21	0.68	0.27	0.36	0.497	1.000	0.497	0.46	1.00	0.229
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.127	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.129	0.46	1.00	0.059
Fatai and injury (Fi)	-9.25	0.43	0.29	0.09	0.127	0.259	0.129	0.40	1.00	0.059
Property Damage Only	44.04	0.70	0.05	0.44	0.000	(5) _{TOTAL} -(5) _{FI}	0.000	0.40	4.00	0.400
(PDO)	-11.34	0.78	0.25	0.44	0.362	0.368		0.46	1.00	0.169

	Worksheet 2F Single-V	ehicle Collisions by Collis	ion Type for Urban and Suburba	n Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(F1)	Predicted N _{bisv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv} (TOTAL) (crashes/year)
	from Table 12-13	(9)FI from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.059	1.000	0.169	0.229
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.000	0.000
Collision with fixed object	0.744	0.044	0.870	0.147	0.192
Collision with other object	0.072	0.004	0.070	0.012	0.016
Other single-vehicle collision	0.040	0.002	0.023	0.004	0.006
Single-vehicle noncollision	0.141	0.008	0.034	0.006	0.014

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(1) (2) (3) (4) (5)								
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}				
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total									
Fatal and injury (FI)				-					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections									
(1)	(1) (2) (3)									
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF							
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CiviF							
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)							
4.15	1.00	1.00	4.15							

Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections											
(1)	(2)					(3)	(4)	(5)	(6)	(7)	
SPF Coefficients Crash Severity Level					Overdispersion	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}		
Crash Seventy Level		fı	om Table 12-1	4		Parameter, k	from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)	
	а	b	С	d	е		Hom Equation 12-29	(4) HOIH WORKSHEEL ZIT		(4) (3) (0)	
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.055	4.15	1.00	0.227	
Fatal and Injury (FI)							1		1.00	0.227	

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections									
(1)	(1) (2) (3) (4) (5)								
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}				
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)				
Total	3.623	0.229	3.852	0.015	0.058				
Fatal and injury (FI)					0.058				

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Workshee	Worksheet 2K Crash Severity Distribution for Urban and Suburban Arterial Intersections								
(1)	(2)	(3)	(4)						
	Fatal and injury (FI)	Property damage only (PDO)	Total						
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;						
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J						
	MULTIPLE-VEHICLE								
Rear-end collisions (from Worksheet 2D)	0.540	1.170	1.710						
Head-on collisions (from Worksheet 2D)	0.059	0.073	0.131						
Angle collisions (from Worksheet 2D)	0.417	0.591	1.008						
Sideswipe (from Worksheet 2D)	0.119	0.078	0.196						
Other multiple-vehicle collision (from Worksheet 2D)	0.066	0.511	0.577						
Subtotal	1.200	2.422	3.623						
	SINGLE-VEHICLE								
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000						
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000						
Collision with fixed object (from Worksheet 2F)	0.044	0.147	0.192						
Collision with other object (from Worksheet 2F)	0.004	0.012	0.016						
Other single-vehicle collision (from Worksheet 2F)	0.002	0.004	0.006						
Single-vehicle noncollision (from Worksheet 2F)	0.008	0.006	0.014						
Collision with pedestrian (from Worksheet 2G or 2I)	0.227	0.000	0.227						
Collision with bicycle (from Worksheet 2J)	0.058	0.000	0.058						
Subtotal	0.344	0.169	0.514						
Total	1.545	2.592	4.136						

Worksheet 2L Summary Resu	Worksheet 2L Summary Results for Urban and Suburban Arterial Intersections							
(1)	(2)							
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)							
	(Total) from Worksheet 2K							
Total	4.1							
Fatal and injury (FI)	1.5							
Property damage only (PDO)	2.6							

Worksheet	1A General In	formation	and Input D	ata for Urban and Suburba	n Roadway	Segments		
General Information				Location Information				
Analyst		TL		Roadway		MD 189 (Falls Road)		
Agency or Company		ATCS		Roadway Section		250 ft east of Wootton Pkwy to I-270 SPUI		
Date Performed		12/07/21		Jurisdiction		Montgomery County		
				Analysis Year		2045		
Input Data				Base Conditions		Site Conditions		
Roadway type (2U, 3T, 4U, 4D, ST)						4D		
Length of segment, L (mi)						0.24		
AADT (veh/day)	$AADT_{MAX} =$	66,000	(veh/day)			30,191		
Type of on-street parking (none/parallel/angle)				None		None		
Proportion of curb length with on-street parking						0		
Median width (ft) - for divided only				15		30		
Lighting (present / not present)				Not Present		Present		
Auto speed enforcement (present / not present)				Not Present		Not Present		
Major commercial driveways (number)						0		
Minor commercial driveways (number)						0		
Major industrial / institutional driveways (number)						0		
Minor industrial / institutional driveways (number)						0		
Major residential driveways (number)						1		
Minor residential driveways (number)						0		
Other driveways (number)						1		
Speed Category						Posted Speed Greater than 30 mph		
Roadside fixed object density (fixed objects / mi)				0		250		
Offset to roadside fixed objects (ft) [If greater than 30 or Not Pr	esent, input 30]			30		18		
Calibration Factor, Cr				1.00		1.00		

Worksheet 1B Crash Modification Factors for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)			
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF			
CMF 1r	CMF 2r	CMF 3r	CMF 4r	CMF 5r	CMF comb			
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)			
1.00	1.51	0.98	0.91	1.00	1.35			

	Worksheet 1C Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments									
(1)	(2	2)	(3)	(4)	(4) (5)		(7)	(8)	(9)	
Crash Severity Level	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
-			Parameter, k	Initial N _{brmv}	Crashes	N_{brmv}	CMFs	Factor, Cr	N _{brmv}	
	from Ta	ble 12-3	from Table 12-3	$(4)_{TOTAL}(3)$		(6) from		(6)*(7)*(8)		
	а	b	HOIII TABIC 12-3	Hom Equation 12-10	() TOTAL ()		Worksheet 1B		(0) (1) (0)	
Total	-12.34	1.36	1.32	1.299	1.000	1.299	1.35	1.00	1.755	
Fotal and Injury (FI)	-12.76	1.28	1.31	0.374	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.354	1.35	4.00	0.470	
Fatal and Injury (FI)	-12.70	1.20	1.31	0.374	0.273	0.354	1.55	1.00	0.478	
D	40.04	4.00	4.04	0.000	(5) _{TOTAL} -(5) _{FI}	0.045	4.05	4.00	4.070	
Property Damage Only (PDO)	-12.81	1.38	1.34	0.998	0.727	0.945	1.35	1.00	1.276	

(1)	(2)	(3)	(4)	(5)	(6)	
Collision Type	Proportion of Collision Type _(FI)	•		Predicted N brmv (PDO) (crashes/year)	Predicted N _{brmv (TOTAL)} (crashes/year)	
	from Table 12-4	(9)FI from Worksheet 1C	from Table 12-4	(9)PDO from Worksheet 1C	(9)TOTAL from Worksheet 1C	
- Total	1.000	0.478	1.000	1.276	1.755	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Rear-end collision	0.832	0.398	0.662	0.845	1.243	
lead-on collision	0.020	0.010	0.007	0.009	0.019	
Angle collision	0.040	0.019	0.036	0.046	0.065	
Sideswipe, same direction	0.050	0.024	0.223	0.285	0.309	
ideswipe, opposite direction	0.010	0.005	0.001	0.001	0.006	
Other multiple-vehicle collision	0.048	0.023	0.071	0.091	0.114	

	Worksheet 1E Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments									
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
Crash Severity Level			Parameter, k	Initial N _{brsv}	Crashes	N _{brsv}	CMFs	Factor, Cr	N _{brsv}	
Clasii Severity Lever	from Ta	ble 12-5	from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)	
	a	b	HOIII TABIC 12-0	Hom Equation 12-13		(4)TOTAL (0)	Worksheet 1B		(0) (1) (0)	
Total	-5.05	0.47	0.86	0.196	1.000	0.196	1.35	1.00	0.265	
Fatal and Injury (FI)	-8.71	0.66	0.28	0.036	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.036	1.35	1.00	0.048	
ratarana injury (i i)	-0.71	0.00	0.20	0.030	0.182	0.000	1.55	1.00	0.040	
Property Demoge Only (PDO)	-5.04	0.45	1.06	0.161	(5) _{TOTAL} -(5) _{FI}	0.160	1.35	1.00	0.217	
Property Damage Only (PDO)	-5.04	0.45	1.06	0.101	0.818	0.100	1.55	1.00	0.217	

(1)	Worksheet 1F Single-Vehi	(3)	1 Type for Orban and Subu	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{brsv} (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N brsv (PDO) (crashes/year)	Predicted N _{brsv (TOTAL)} (crashes/year)
•	from Table 12-6	(9) _{FI} from Worksheet 1E	from Table 12-6	(9)PDO from Worksheet 1E	(9)TOTAL from Worksheet 1E
Total	1.000	0.048	1.000	0.217	0.265
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.001	0.000	0.063	0.014	0.014
Collision with fixed object	0.500	0.024	0.813	0.176	0.200
Collision with other object	0.028	0.001	0.016	0.003	0.005
Other single-vehicle collision	0.471	0.023	0.108	0.023	0.046

Works	sheet 1G Multiple-Vehicle Drive	way-Related Collisions by	y Driveway Type for Urban	and Suburban Roadway Segments	
(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	Number of driveways,	Crashes per driveway per year, N _j	Coefficient for traffic adjustment, t	Initial N _{brdwy}	Overdispersion parameter, k
	n _j	from Table 12-7	from Table 12-7	Equation 12-16 n _i * N _i * (AADT/15,000) ^t	from Table 12-7
Major commercial	0	0.033	1.106	0.000	
Minor commercial	0	0.011	1.106	0.000	
Major industrial/institutional	0	0.036	1.106	0.000	
Minor industrial/institutional	0	0.005	1.106	0.000	
Major residential	1	0.018	1.106	0.039	
Minor residential	0	0.003	1.106	0.000	
Other	1	0.005	1.106	0.011	
Total				0.050	1.39

Worksheet 1H Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	
Crash Severity Level	Initial N _{brdwy}	Proportion of total crashes (f _{dwy})	Adjusted N _{brdwy}	Combined CMFs	Calibration factor, C,	Predicted N _{brdwy}	
Crash Seventy Level	(5) _{TOTAL} from Worksheet 1G	from Table 12-7	(2) _{TOTAL} * (3)	(6) from Worksheet 1B	Cambration factor, C _r	(4)*(5)*(6)	
Total	0.050	1.000	0.050	1.35	1.00	0.067	
Fatal and injury (FI)		0.284	0.014	1.35	1.00	0.019	
Property damage only (PDO)		0.716	0.036	1.35	1.00	0.048	

	Worksheet 1I Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(8)*		
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{pedr}	Predicted N _{pedr}		
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8	(5)*(6)		
Total	1.755	0.265	0.067	2.087	0.019	0.040		
Fatal and injury (FI)						0.040		

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-19

	Worksheet 1J Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(8)*		
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{biker}	Predicted N _{biker}		
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9	(5)*(6)		
Total	1.755	0.265	0.067	2.087	0.005	0.010		
Fatal and injury (FI)						0.010		

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-20

(1)	(2)	(3)	(4)
\ /	Fatal and injury (FI)	Property damage only (PDO)	Total
N=111-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-	(3) from Worksheet 1D and 1F;	(5) from Worksheet 1D and 1F; and	(6) from Worksheet 1D and 1F;
Collision type	(7) from Worksheet 1H; and	(7) from Worksheet 1H	(7) from Worksheet 1H; and
	(8) from Worksheet 1I and 1J		(8) from Worksheet 1I and 1J
	MULTIPLE-VEHICLE	•	
Rear-end collisions (from Worksheet 1D)	0.398	0.845	1.243
lead-on collisions (from Worksheet 1D)	0.010	0.009	0.019
Angle collisions (from Worksheet 1D)	0.019	0.046	0.065
Sideswipe, same direction (from Worksheet 1D)	0.024	0.285	0.309
Sideswipe, opposite direction (from Worksheet 1D)	0.005	0.001	0.006
Oriveway-related collisions (from Worksheet 1H)	0.019	0.048	0.067
Other multiple-vehicle collision (from Worksheet 1D)	0.023	0.091	0.114
Subtotal	0.497	1.325	1.822
	SINGLE-VEHICLE		•
Collision with animal (from Worksheet 1F)	0.000	0.014	0.014
Collision with fixed object (from Worksheet 1F)	0.024	0.176	0.200
Collision with other object (from Worksheet 1F)	0.001	0.003	0.005
Other single-vehicle collision (from Worksheet 1F)	0.023	0.023	0.046
Collision with pedestrian (from Worksheet 1I)	0.040	0.000	0.040
Collision with bicycle (from Worksheet 1J)	0.010	0.000	0.010
Subtotal	0.098	0.217	0.315
-otal	0.596	1.541	2.137

Worksheet 1L Summary Results for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)				
Crash Severity Level	Predicted average crash frequency, N predicted rs (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)				
	(Total) from Worksheet 1K	Ī	(2) / (3)				
Total	2.1	0.24	8.9				
Fatal and injury (FI)	0.6	0.24	2.5				
Property damage only (PDO)	1.5	0.24	6.4				

		ation and input D	ata for Urban and Suburbar			
General Information			Location Information			
Analyst	TL		Roadway	MD 189 (Falls Road)		
Agency or Company	ATC	S	Roadway Section	I-279 SPUI to 250 ft west of Great Falls Rd.		
Date Performed	12/07	/21	Jurisdiction	Montgomery County		
			Analysis Year	2045		
Input Data			Base Conditions	Site Conditions		
Roadway type (2U, 3T, 4U, 4D, ST)				4D		
Length of segment, L (mi)				0.02		
AADT (veh/day)	$AADT_{MAX} = 66,0$	000 (veh/day)		21,597		
Type of on-street parking (none/parallel/angle)			None	None		
Proportion of curb length with on-street parking				0		
Median width (ft) - for divided only			15	15		
Lighting (present / not present)			Not Present	Present		
Auto speed enforcement (present / not present)			Not Present	Not Present		
Major commercial driveways (number)				0		
Minor commercial driveways (number)				0		
Major industrial / institutional driveways (number)				0		
Minor industrial / institutional driveways (number)				0		
Major residential driveways (number)				0		
Minor residential driveways (number)				0		
Other driveways (number)				0		
Speed Category				Posted Speed 30 mph or Lower		
Roadside fixed object density (fixed objects / mi)			0	100		
Offset to roadside fixed objects (ft) [If greater than 30 or Not Pr	esent, input 30]		30	11		
Calibration Factor, Cr			1.00	1.00		

	Worksheet 1B Crash Modification Factors for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)			
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF			
CMF 1r	CMF 2r	CMF 3r	CMF 4r	CMF 5r	CMF comb			
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)			
1.00	1.26	1.00	0.91	1.00	1.15			

(1)	(2	2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	SPF Coe	efficients	Overdispersion Parameter, k	Initial N _{brmv}	Proportion of Total Crashes	Adjusted N _{brmv}	Combined CMFs	Calibration Factor, Cr	Predicted N _{brmv}
	from Ta a	ble 12-3 b	from Table 12-3	from Equation 12-10		(4) _{TOTAL} *(5)	(6) from Worksheet 1B	,	(6)*(7)*(8)
Total	-12.34	1.36	1.32	0.069	1.000	0.069	1.15	1.00	0.079
Fatal and Injury (FI)	-12.76	1.28	1.31	0.020	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.279	0.019	1.15	1.00	0.022
Property Damage Only (PDO)	-12.81	1.38	1.34	0.052	(5) _{TOTAL} -(5) _{FI} 0.721	0.049	1.15	1.00	0.057

(1)	(2)	(3)	(4)	(5)	(6)	
Collision Type	Proportion of Collision Type _(FI)	Predicted N brmv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N brmv (PDO) (crashes/year)	Predicted N _{brmv} (TOTAL) (crashes/year)	
	from Table 12-4	(9)FI from Worksheet 1C	from Table 12-4	(9)PDO from Worksheet 1C	(9)TOTAL from Worksheet 1C	
- Total	1.000	0.022	1.000	0.057	0.079	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Rear-end collision	0.832	0.018	0.662	0.038	0.056	
lead-on collision	0.020	0.000	0.007	0.000	0.001	
Angle collision	0.040	0.001	0.036	0.002	0.003	
Sideswipe, same direction	0.050	0.001	0.223	0.013	0.014	
ideswipe, opposite direction	0.010	0.000	0.001	0.000	0.000	
Other multiple-vehicle collision	0.048	0.001	0.071	0.004	0.005	

	W	orksheet 1E -	- Single-Vehicle Collisions I	y Severity Level for Urba	an and Suburban Road	vay Segments	;		
(1)	(2	2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
Crash Severity Level			Parameter, k	Initial N _{brsv}	Crashes	N_{brsv}	CMFs	Factor, Cr	N_{brsv}
Clasii Severity Lever	from Ta	ble 12-5	from Table 12-5	from Equation 12-13	guation 12-13		(6) from		(6)*(7)*(8)
	а	b	HOIII TABIC 12-0	Hom Equation 12-13		(4) _{TOTAL} *(5)	Worksheet 1B		
Total	-5.05	0.47	0.86	0.014	1.000	0.014	1.15	1.00	0.016
Fatal and Injury (FI)	-8.71	0.66	0.28	0.002	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.002	1.15	1.00	0.003
- atai and injury (i i)	-0.71	0.00	0.20	0.002	0.172	0.002	1.10	1.00	0.003
Property Damage Only (PDO)	-5.04	0.45	1.06	0.012	(5) _{TOTAL} -(5) _{FI}	0.012	1.15	1.00	0.013
Froperty Damage Only (PDO)	-5.04	0.45	1.00	0.012	0.828	0.012	1.15	1.00	0.013

	Worksheet 1F Single-Vehi	cle Collisions by Collisior	n Type for Urban and Subu	rban Roadway Segments	
(1)	(2)	(3)	(4)	(5)	(6)
Callinian Tuna	Proportion of Collision Type _(FI)	Predicted N brsv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N brsv (PDO) (crashes/year)	Predicted N _{brsv (TOTAL)} (crashes/year)
Collision Type	from Table 12-6	(9)FI from Worksheet 1E	from Table 12-6	(9)PDO from Worksheet 1E	(9)TOTAL from Worksheet 1E
Total	1.000	0.003	1.000	0.013	0.016
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.001	0.000	0.063	0.001	0.001
Collision with fixed object	0.500	0.001	0.813	0.011	0.012
Collision with other object	0.028	0.000	0.016	0.000	0.000
Other single-vehicle collision	0.471	0.001	0.108	0.001	0.003

Worksheet	1G Multiple-Vehicle Drive	way-Related Collisions by	y Driveway Type for Urban	and Suburban Roadway Segments	
(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	Number of driveways,	Crashes per driveway per year, N _j	Coefficient for traffic adjustment, t	Initial N _{brdwy}	Overdispersion parameter, k
	n _j	from Table 12-7	from Table 12-7	Equation 12-16	from Table 12-7
	i iioiii lable izi		HOIH Table 12-7	n _i * N _i * (AADT/15,000) ^t	IIOIII TADIE 12-7
Major commercial	0	0.033	1.106	0.000	
Minor commercial	0	0.011	1.106	0.000	
Major industrial/institutional	0	0.036	1.106	0.000	
Minor industrial/institutional	0	0.005	1.106	0.000	
Major residential	0	0.018	1.106	0.000	
Minor residential	0	0.003	1.106	0.000	
Other	0	0.005	1.106	0.000	
Total				0.000	1.39

Worksheet 1H Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	
Crash Severity Level	Initial N _{brdwy}	Proportion of total crashes (f _{dwy})	Adjusted N _{brdwy}	Combined CMFs	Calibration factor, C,	Predicted N _{brdwy}	
	(5) _{TOTAL} from Worksheet 1G	from Table 12-7	(2) _{TOTAL} * (3)	(6) from Worksheet 1B	, ,	(4)*(5)*(6)	
Total	0.000	1.000	0.000	1.15	1.00	0.000	
Fatal and injury (FI)		0.284	0.000	1.15	1.00	0.000	
Property damage only (PDO)		0.716	0.000	1.15	1.00	0.000	

	Worksheet 1I Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(8)*		
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{pedr}	Predicted N _{pedr}		
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8	(5)*(6)		
Total	0.079	0.016	0.000	0.095	0.067	0.006		
Fatal and injury (FI)						0.006		

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-19

	Worksheet 1J Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(8)*		
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{biker}	Predicted N _{biker}		
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9	(5)*(6)		
Total	0.079	0.016	0.000	0.095	0.013	0.001		
Fatal and injury (FI)						0.001		

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-20

(1)	et 1K Crash Severity Distribution for Urban a	(3)	(4)
(1)	Fatal and injury (FI)	Property damage only (PDO)	Total
	(3) from Worksheet 1D and 1F;	(5) from Worksheet 1D and 1F; and	(6) from Worksheet 1D and 1F;
Collision type	(7) from Worksheet 1H; and	(7) from Worksheet 1H	(7) from Worksheet 1H; and
		(7) Holli Worksheet 111	(8) from Worksheet 1I and 1J
	(8) from Worksheet 1I and 1J		(8) from Worksheet II and IJ
	MULTIPLE-VEHICLE		
Rear-end collisions (from Worksheet 1D)	0.018	0.038	0.056
Head-on collisions (from Worksheet 1D)	0.000	0.000	0.001
Angle collisions (from Worksheet 1D)	0.001	0.002	0.003
Sideswipe, same direction (from Worksheet 1D)	0.001	0.013	0.014
Sideswipe, opposite direction (from Worksheet 1D)	0.000	0.000	0.000
Oriveway-related collisions (from Worksheet 1H)	0.000	0.000	0.000
Other multiple-vehicle collision (from Worksheet 1D)	0.001	0.004	0.005
Subtotal	0.022	0.057	0.079
	SINGLE-VEHICLE		
Collision with animal (from Worksheet 1F)	0.000	0.001	0.001
Collision with fixed object (from Worksheet 1F)	0.001	0.011	0.012
Collision with other object (from Worksheet 1F)	0.000	0.000	0.000
Other single-vehicle collision (from Worksheet 1F)	0.001	0.001	0.003
Collision with pedestrian (from Worksheet 1I)	0.006	0.000	0.006
Collision with bicycle (from Worksheet 1J)	0.001	0.000	0.001
Subtotal	0.010	0.013	0.024
Total Total	0.032	0.070	0.103

V	Worksheet 1L Summary Results for Urban and Suburban Roadway Segments							
(1)	(2)	(2)						
Crash Severity Level	Predicted average crash frequency, N predicted rs (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)					
	(Total) from Worksheet 1K		(2) / (3)					
Total	0.1	0.02	5.1					
Fatal and injury (FI)	0.0	0.02	1.6					
Property damage only (PDO)	0.1	0.02	3.5					

	Worksheet 2A General Information and Input	Data for Orban and Suburban A	
	Information		Location Information
Analyst	TL	Roadway	MD 189 (Falls Road)
Agency or Company	ATCS	Intersection	MD 189 at Great Falls Road
Date Performed	12/07/21	Jurisdiction	Montgomery County
		Analysis Year	2045
	ut Data	Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)	AADT		4SG
AADT _{major} (veh/day)	$AADT_{MAX} = 67,700 (veh/day)$		19,762
AADT _{minor} (veh/day)	$AADT_{MAX} = 33,400 (veh/day)$	-	5,926
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C _i		1.00	1.00
Data for unsignalized intersections only:		-	
Number of major-road approaches with left-	turn lanes (0,1,2)	0	0
Number of major-road approaches with righ	t-turn lanes (0,1,2)	0	0
Data for signalized intersections only:			
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	3
Number of approaches with right-turn lanes	(0,1,2,3,4) [for 3SG, use maximum value of 3]	0	1
Number of approaches with left-turn signal	phasing [for 3SG, use maximum value of 3]		1
Type of left-turn signal phasing for Leg #1		Permissive	Permissive / Protected
Type of left-turn signal phasing for Leg #2		-	Permissive
Type of left-turn signal phasing for Leg #3		-	Permissive
Type of left-turn signal phasing for Leg #4 (if applicable)		Permissive
	d prohibited [for 3SG, use maximum value of 3]	0	0
Intersection red light cameras (present/not	present)	Not Present	Not Present
Sum of all pedestrian crossing volumes (Pe	edVoI) Signalized intersections only		491
Maximum number of lanes crossed by a pe	destrian (n _{lanesx})		6
Number of bus stops within 300 m (1,000 ft) of the intersection	0	4
Schools within 300 m (1,000 ft) of the inters	\ \	Not Present	Not Present
Number of alcohol sales establishments wit	hin 300 m (1,000 ft) of the intersection	0	0

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections								
(1)	(2)	(3)	(4)	(5)	(6)	(7)			
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF			
	Phasing								
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}			
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)			
0.73	0.99	0.96	1.00	0.91	1.00	0.63			

	Worksheet 2C Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections										
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
Crash Severity Level	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
-		from Toble 40.40		Parameter, k	Initial N _{bimv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bimv}	
	from Table 12-10		from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)		
	а	b	С	Holli Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)	
Total	-10.99	1.07	0.23	0.39	4.913	1.000	4.913	0.63	1.00	3.104	
Fotal and Injuny (FI)	-13.14	1.18	0.22	0.33	1.558	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	1.618	0.63	1.00	1.022	
Fatal and Injury (FI)	-13.14	1.10	0.22	0.33	1.000	0.329	1.010	0.03	1.00	1.022	
Property Damage Only	44.00	4.00	0.04	0.44	0.470	(5) _{TOTAL} -(5) _{FI}	0.005	0.00	4.00	0.000	
(PDO)	-11.02	1.02	0.24	0.44	3.172	0.671	3.295	0.63	1.00	2.082	

	Worksheet 2D Multiple-	Vehicle Collisions by Collis	sion Type for Urban and Suburb	an Arterial Intersections		
(1)	(2)	(3)	(4)	(5)	(6)	
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bimv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv (TOTAL)} (crashes/year)	
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C	
Total	1.000	1.022	1.000	2.082	3.104	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Rear-end collision	0.450	0.460	0.483	1.006	1.466	
Head-on collision	0.049	0.050	0.030	0.062	0.113	
Angle collision	0.347	0.355	0.244	0.508	0.863	
Sideswipe	0.099	0.101	0.032	0.067	0.168	
Other multiple-vehicle collision	0.055	0.056	0.211	0.439	0.496	

		Worksheet	2E Single-\	ehicle Collisions by Severi	ity Level for Urban	and Suburban Arterial In	tersections				
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
	SPF Coefficients		SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
			Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}		
Crash Severity Level	fr	om Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)	
а		a b	С	from Table 12-12	(FI) from Eqn. 12-		(T)TOTAL (U)	Worksheet 2B		(0) (1) (0)	
	а	D	C		24 or 12-27						
Total	-10.21	0.68	0.27	0.36	0.320	1.000	0.320	0.63	1.00	0.202	
Fotal and Injury (FI)	-9.25	0.43	0.29	0.09	0.084	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.085	0.63	1.00	0.053	
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.004	0.264	0.005	0.03	1.00	0.055	
Property Damage Only	44.04	0.70	0.05	0.44	0.004	(5) _{TOTAL} -(5) _{FI}	0.000	0.00	4.00	0.440	
(PDO)	-11.34	0.78	0.25	0.44	0.234	0.736	0.236	0.63	1.00	0.149	

(1)	(2)	(3)	ion Type for Urban and Suburba (4)	(5)	(6)
Collision Type	Proportion of Collision Type _(F1)	Predicted N bisv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv (TOTAL)} (crashes/year)
	from Table 12-13	(9) _{FI} from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.053	1.000	0.149	0.202
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.000	0.000
Collision with fixed object	0.744	0.040	0.870	0.130	0.169
Collision with other object	0.072	0.004	0.070	0.010	0.014
Other single-vehicle collision	0.040	0.002	0.023	0.003	0.006
Single-vehicle noncollision	0.141	0.008	0.034	0.005	0.013

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(1) (2) (3) (4) (5)								
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}				
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total				-					
Fatal and injury (FI)				-					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections								
(1)	(1) (2) (3) (4)								
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF						
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CMF						
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)						
4.15	1.00	1.00	4.15						

Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections										
(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	SPF Coefficients					Overdispersion	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}
Crash Seventy Level		from Table 12-14					from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)
	а	b	С	d	е		Hom Equation 12-29	(4) HOIH WORKSHEEL ZIT		(4) (3) (0)
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.064	4.15	1.00	0.264
Fatal and Injury (FI)							1		1.00	0.264

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections								
(1)	(2)	(2) (3) (4) (5)						
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}			
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)			
Total	3.104	0.202	3.307	0.015	0.050			
Fatal and injury (FI)		-			0.050			

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksh	eet 2K Crash Severity Distribution for Urban a	nd Suburban Arterial Intersections	
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE	·	• • •
Rear-end collisions (from Worksheet 2D)	0.460	1.006	1.466
Head-on collisions (from Worksheet 2D)	0.050	0.062	0.113
Angle collisions (from Worksheet 2D)	0.355	0.508	0.863
Sideswipe (from Worksheet 2D)	0.101	0.067	0.168
Other multiple-vehicle collision (from Worksheet 2D)	0.056	0.439	0.496
Subtotal	1.022	2.082	3.104
	SINGLE-VEHICLE		
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 2F)	0.040	0.130	0.169
Collision with other object (from Worksheet 2F)	0.004	0.010	0.014
Other single-vehicle collision (from Worksheet 2F)	0.002	0.003	0.006
Single-vehicle noncollision (from Worksheet 2F)	0.008	0.005	0.013
Collision with pedestrian (from Worksheet 2G or 2I)	0.264	0.000	0.264
Collision with bicycle (from Worksheet 2J)	0.050	0.000	0.050
Subtotal	0.368	0.149	0.516
Total	1.390	2.231	3.621

Worksheet 2L Summary Resu	Worksheet 2L Summary Results for Urban and Suburban Arterial Intersections						
(1)	(2)						
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)						
	(Total) from Worksheet 2K						
Total	3.6						
Fatal and injury (FI)	1.4						
Property damage only (PDO)	2.2						

	Worksheet 2A General Information and Input	Data for Orban and Suburban Ar	
	nformation		Location Information
Analyst	TL	Roadway	MD 190 River Road
Agency or Company	ATCS	Intersection	At Seven Locks Road
Date Performed	12/07/21	Jurisdiction	Montgomery County
		Analysis Year	2045
· ·	t Data	Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)	AADT		4SG
AADT _{major} (veh/day)	$AADT_{MAX} = 67,700 (veh/day)$		23,812
AADT minor (veh/day)	$AADT_{MAX} = 33,400 (veh/day)$	-	12,567
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C _i		1.00	1.00
Data for unsignalized intersections only:			
Number of major-road approaches with left-t	urn lanes (0,1,2)	0	0
Number of major-road approaches with right	-turn lanes (0,1,2)	0	0
Data for signalized intersections only:			
Number of approaches with left-turn lanes (0	,1,2,3,4) [for 3SG, use maximum value of 3]	0	4
Number of approaches with right-turn lanes ((0,1,2,3,4) [for 3SG, use maximum value of 3]	0	2
Number of approaches with left-turn signal p	hasing [for 3SG, use maximum value of 3]		3
Type of left-turn signal phasing for Leg #1		Permissive	Permissive
Type of left-turn signal phasing for Leg #2			Permissive / Protected
Type of left-turn signal phasing for Leg #3			Protected
Type of left-turn signal phasing for Leg #4 (if	applicable)		Protected
Number of approaches with right-turn-on-red	prohibited [for 3SG, use maximum value of 3]	0	0
Intersection red light cameras (present/not p		Not Present	Not Present
Sum of all pedestrian crossing volumes (Pe	dVol) Signalized intersections only		44
Maximum number of lanes crossed by a ped	estrian (n _{lanesx})		6
Number of bus stops within 300 m (1,000 ft)		0	4
Schools within 300 m (1,000 ft) of the interse	\(\)	Not Present	Not Present
Number of alcohol sales establishments with	in 300 m (1,000 ft) of the intersection	0	0

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections							
(1)	(2)	(3)	(4)	(5)	(6)	(7)		
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF		
	Phasing							
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}		
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)		
0.66	0.87	0.92	1.00	0.91	1.00	0.48		

	Worksheet 2C Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections											
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Crash Severity Level	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
-				Parameter, k	Initial N _{bimv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bimv}		
	fr	om Table 12-1	0	from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)		
	а	b	С	IIOIII Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)		
Total	-10.99	1.07	0.23	0.39	7.130	1.000	7.130	0.48	1.00	3.455		
Fotal and Injuny (FI)	-13.14	1.18	0.22	0.33	0.000	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	2.372	0.48	1.00	1.149		
Fatal and Injury (FI)	-13.14	1.10	0.22	0.33	2.290	0.333	2.372	0.40	1.00	1.149		
Property Damage Only	-11.02	1.02	0.24	0.44	4.594	(5) _{TOTAL} -(5) _{FI}	4.758	0.48	1.00	2.306		
(PDO)	-11.02	1.02	0.24	0.44	4.594	0.667	4.750	0.40	1.00	2.300		

	Worksheet 2D Multiple-	Vehicle Collisions by Collis	sion Type for Urban and Suburb	an Arterial Intersections		
(1)	(2)	(3)	(4)	(5)	(6)	
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bimv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv} (TOTAL) (crashes/year)	
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C	
Total	1.000	1.149	1.000	2.306	3.455	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Rear-end collision	0.450	0.517	0.483	1.114	1.631	
Head-on collision	0.049	0.056	0.030	0.069	0.125	
Angle collision	0.347	0.399	0.244	0.563	0.961	
Sideswipe	0.099	0.114	0.032	0.074	0.188	
Other multiple-vehicle collision	0.055	0.063	0.211	0.487	0.550	

		Worksheet	2E Single-\	ehicle Collisions by Severi	ity Level for Urban	and Suburban Arterial In	tersections			
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
			Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}	
Crash Severity Level	fr	om Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from	Ī	(6)*(7)*(8)
		h		from Table 12-12	(FI) from Eqn. 12-		(T)TOTAL (U)	Worksheet 2B	i /	(0) (1) (0)
	а	b	С		24 or 12-27					
Total	-10.21	0.68	0.27	0.36	0.446	1.000	0.446	0.48	1.00	0.216
Fotal and Injury (FI)	-9.25	0.43	0.29	0.09	0.113	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.115	0.48	1.00	0.056
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.113	0.257	0.113	0.40	1.00	0.030
Property Damage Only	44.04	0.70	0.05	0.44	0.000	(5) _{TOTAL} -(5) _{FI}	0.004	0.40	4.00	0.400
(PDO)	-11.34	0.78	0.25	0.44	0.326	0.743	0.331	0.48	1.00	0.160

(1)	(2)	(3)	ion Type for Urban and Suburba (4)	(5)	(6)
Collision Type	Proportion of Collision Type _(F1)	Predicted N bisv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv (TOTAL)} (crashes/year)
	from Table 12-13	(9) _{FI} from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.056	1.000	0.160	0.216
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.000	0.000
Collision with fixed object	0.744	0.041	0.870	0.139	0.181
Collision with other object	0.072	0.004	0.070	0.011	0.015
Other single-vehicle collision	0.040	0.002	0.023	0.004	0.006
Single-vehicle noncollision	0.141	0.008	0.034	0.005	0.013

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(2)	(3)	(4)	(5)	(7)*				
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	\mathbf{f}_{pedi}	Predicted N _{pedi}				
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total				-					
Fatal and injury (FI)		-		-					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections									
(1)	(1) (2) (3)									
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF							
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CiviF							
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)							
4.15	1.00	1.00	4.15							

Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections											
(1)		(2)					(4)	(5)	(6)	(7)	
Crash Severity Level	SPF Coefficients					Overdispersion	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}	
Crash Seventy Level		fı	om Table 12-1	14		Parameter, k	from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)	
	а	b	С	d	е		Hom Equation 12-29	(4) HOIH WORKSHEEL ZIT		(4) (3) (0)	
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.029	4.15	1.00	0.119	
Fatal and Injury (FI)							1		1.00	0.119	

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections									
(1)	(2) (3) (4) (5)								
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}				
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)				
Total	3.455	0.216	3.671	0.015	0.055				
Fatal and injury (FI)		-			0.055				

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksn	neet 2K Crash Severity Distribution for Urban a	nd Suburban Arterial Intersections	
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE	·	•
Rear-end collisions (from Worksheet 2D)	0.517	1.114	1.631
Head-on collisions (from Worksheet 2D)	0.056	0.069	0.125
Angle collisions (from Worksheet 2D)	0.399	0.563	0.961
Sideswipe (from Worksheet 2D)	0.114	0.074	0.188
Other multiple-vehicle collision (from Worksheet 2D)	0.063	0.487	0.550
Subtotal	1.149	2.306	3.455
	SINGLE-VEHICLE	·	
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 2F)	0.041	0.139	0.181
Collision with other object (from Worksheet 2F)	0.004	0.011	0.015
Other single-vehicle collision (from Worksheet 2F)	0.002	0.004	0.006
Single-vehicle noncollision (from Worksheet 2F)	0.008	0.005	0.013
Collision with pedestrian (from Worksheet 2G or 2I)	0.119	0.000	0.119
Collision with bicycle (from Worksheet 2J)	0.055	0.000	0.055
Subtotal	0.230	0.160	0.390
Total	1.379	2.466	3.845

Worksheet 2L Summary Resul	ts for Urban and Suburban Arterial Intersections
(1)	(2)
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)
	(Total) from Worksheet 2K
Total	3.8
Fatal and injury (FI)	1.4
Property damage only (PDO)	2.5

Worksheet	1A General In	formation	and Input D	ata for Urban and Suburba	n Roadway	Segments
General Information						Location Information
Analyst		TL		Roadway		MD 190 River Road
Agency or Company		ATCS		Roadway Section		Seven Locks Road to I-495 SB Terminal
Date Performed	,	12/07/21		Jurisdiction		Montgomery County
				Analysis Year		2045
Input Data				Base Conditions		Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)						4D
Length of segment, L (mi)						0.09
AADT (veh/day)	AADT _{MAX} =	66,000	(veh/day)			24,393
Type of on-street parking (none/parallel/angle)				None		None
Proportion of curb length with on-street parking						0
Median width (ft) - for divided only				15		15
Lighting (present / not present)				Not Present		Present
Auto speed enforcement (present / not present)				Not Present		Not Present
Major commercial driveways (number)						0
Minor commercial driveways (number)						0
Major industrial / institutional driveways (number)						0
Minor industrial / institutional driveways (number)						0
Major residential driveways (number)						0
Minor residential driveways (number)						1
Other driveways (number)						0
Speed Category						Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)				0		44
Offset to roadside fixed objects (ft) [If greater than 30 or Not Pr	esent, input 30]			30		8
Calibration Factor, Cr				1.00		1.00

	Worksheet 1B Crash Modification Factors for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)				
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF				
CMF 1r	CMF 2r	CMF 3r	CMF 4r	CMF 5r	CMF comb				
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)				
1.00	1.12	1.00	0.91	1.00	1.03				

	Workshee	et 1C Multipl	Worksheet 1C Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments										
(1)	(1) (2)		(3)		(5)	(6)	(7)	(8)	(9)				
Crash Severity Level	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted				
-			Parameter, k	Initial N _{brmv}	Crashes	N_{brmv}	CMFs	Factor, Cr	N _{brmv}				
	from Ta	ble 12-3	from Table 12-3	from Equation 12-10		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)				
	а	b	Holli Table 12-3	IIOIII Equation 12-10		(4)TOTAL (3)	Worksheet 1B						
Total	-12.34	1.36	1.32	0.365	1.000	0.365	1.03	1.00	0.374				
Fatal and Injury (FI)	-12.76	1.28	1.31	0.107	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.101	1.03	1.00	0.104				
r didi dila injary (i i)	12.70	1.20	1.51	0.107	0.277	0.101	1.00	1.00	0.101				
Property Damage Only (PDO)	-12.81	1.38	1.34	0.279	(5) _{TOTAL} -(5) _{FI}	0.264	1.03	1.00	0.271				
Froperty Damage Only (FDO)	-12.01	1.30	1.34	0.279	0.723	0.204	1.03	1.00	0.27 1				

Wor	rksheet 1D Multiple-Vehicle No	ndriveway Collisions by	Collision Type for Urban an	id Suburban Roadway Se	egments
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type(FI)	Predicted N brmv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N brmv (PDO) (crashes/year)	Predicted N _{brmv (TOTAL)} (crashes/year)
	from Table 12-4	(9)FI from Worksheet 1C	from Table 12-4	(9)PDO from Worksheet 1C	(9)TOTAL from Worksheet 1C
Total	1.000	0.104	1.000	0.271	0.374
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.832	0.086	0.662	0.179	0.265
Head-on collision	0.020	0.002	0.007	0.002	0.004
Angle collision	0.040	0.004	0.036	0.010	0.014
Sideswipe, same direction	0.050	0.005	0.223	0.060	0.066
Sideswipe, opposite direction	0.010	0.001	0.001	0.000	0.001
Other multiple-vehicle collision	0.048	0.005	0.071	0.019	0.024

	Worksheet 1E Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments										
(1)	(2	2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)		
	SPF Coe	SPF Coefficients Overdispersion			Proportion of Total	Adjusted	Combined	Calibration	Predicted		
Crash Severity Level			Parameter, k	Initial N _{brsv}	Crashes	N_{brsv}	CMFs	Factor, Cr	N_{brsv}		
Orasii Geventy Level	from Ta	ble 12-5	from Table 12-5	Table 12-5 from Equation 12-13		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)		
	a	b	HOIII TABIC 12-3	Hom Equation 12-15		(T)IOIAL (O)	Worksheet 1B		(0) (1) (0)		
Total	-5.05	0.47	0.86	0.067	1.000	0.067	1.03	1.00	0.068		
Fatal and Injury (FI)	-8.71	0.66	0.28	0.012	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.012	1.03	1.00	0.012		
- atai and injury (i i)	-0.71	0.00	0.20	0.012	0.175	0.012	1.00	1.00	0.012		
Property Damage Only (PDO)	-5.04	0.45	1.06	0.055	(5) _{TOTAL} -(5) _{FI}	0.055	1.03	1.00	0.056		
Property Damage Only (PDO)	-5.04	0.45	1.00	0.055	0.825	0.055	1.03	1.00	0.056		

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N brsv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N brsv (PDO) (crashes/year)	Predicted N _{brsv (TOTAL)} (crashes/year)
,	from Table 12-6	(9) _{FI} from Worksheet 1E	from Table 12-6	(9)PDO from Worksheet 1E	(9)TOTAL from Worksheet 1E
Total	1.000	0.012	1.000	0.056	0.068
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.001	0.000	0.063	0.004	0.004
Collision with fixed object	0.500	0.006	0.813	0.046	0.052
Collision with other object	0.028	0.000	0.016	0.001	0.001
Other single-vehicle collision	0.471	0.006	0.108	0.006	0.012

Worksheet	1G Multiple-Vehicle Drive	way-Related Collisions by	y Driveway Type for Urban	and Suburban Roadway Segments		
(1)	(2)	(3)	(4)	(5)	(6)	
Driveway Type	Number of driveways,	Crashes per driveway per year, N _j	Coefficient for traffic adjustment, t	Initial N _{brdwy}	Overdispersion parameter, k	
Driveway Type	n _i	from Table 12-7	from Table 12-7	Equation 12-16	from Table 12-7	
	itotti table 12-7		ITOTTI TABLE 12-7	n _i * N _i * (AADT/15,000) ^t	Hom rable 12-7	
Major commercial	0	0.033	1.106	0.000		
Minor commercial	0	0.011	1.106	0.000		
Major industrial/institutional	0	0.036	1.106	0.000		
Minor industrial/institutional	0	0.005	1.106	0.000		
Major residential	0	0.018	1.106	0.000		
Minor residential	1	0.003	1.106	0.005		
Other	0	0.005	1.106	0.000		
Total				0.005	1.39	

Worksheet 1H Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(7)		
Crash Severity Level	Initial N _{brdwy}	Proportion of total crashes (f _{dwy})	Adjusted N _{brdwy}	Combined CMFs	Calibration factor, C,	Predicted N _{brdwy}		
Crash Severity Level	(5) _{TOTAL} from Worksheet 1G	from Table 12-7	(2) _{TOTAL} * (3)	(6) from Worksheet 1B	, ,	(4)*(5)*(6)		
Total	0.005	1.000	0.005	1.03	1.00	0.005		
Fatal and injury (FI)		0.284	0.001	1.03	1.00	0.001		
Property damage only (PDO)		0.716	0.004	1.03	1.00	0.004		

	Worksheet 1I Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)	(8)*				
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{pedr}	Predicted N _{pedr}				
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8	(5)*(6)				
Total	0.374	0.068	0.005	0.448	0.019	0.009				
Fatal and injury (FI)						0.009				

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-19

	Worksheet 1J Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(8)*			
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{biker}	Predicted N _{biker}			
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9	(5)*(6)			
Total	0.374	0.068	0.005	0.448	0.005	0.002			
Fatal and injury (FI)						0.002			

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-20

(1)	(2)	(3)	(4)
· · · · · · · · · · · · · · · · · · ·	Fatal and injury (FI)	Property damage only (PDO)	Total
Callinian tuna	(3) from Worksheet 1D and 1F;	(5) from Worksheet 1D and 1F; and	(6) from Worksheet 1D and 1F;
Collision type	(7) from Worksheet 1H; and	(7) from Worksheet 1H	(7) from Worksheet 1H; and
	(8) from Worksheet 1I and 1J		(8) from Worksheet 1I and 1J
	MULTIPLE-VEHICLE	•	
Rear-end collisions (from Worksheet 1D)	0.086	0.179	0.265
Head-on collisions (from Worksheet 1D)	0.002	0.002	0.004
Angle collisions (from Worksheet 1D)	0.004	0.010	0.014
Sideswipe, same direction (from Worksheet 1D)	0.005	0.060	0.066
Sideswipe, opposite direction (from Worksheet 1D)	0.001	0.000	0.001
Oriveway-related collisions (from Worksheet 1H)	0.001	0.004	0.005
Other multiple-vehicle collision (from Worksheet 1D)	0.005	0.019	0.024
Subtotal	0.105	0.274	0.379
	SINGLE-VEHICLE		
Collision with animal (from Worksheet 1F)	0.000	0.004	0.004
Collision with fixed object (from Worksheet 1F)	0.006	0.046	0.052
Collision with other object (from Worksheet 1F)	0.000	0.001	0.001
Other single-vehicle collision (from Worksheet 1F)	0.006	0.006	0.012
Collision with pedestrian (from Worksheet 1I)	0.009	0.000	0.009
Collision with bicycle (from Worksheet 1J)	0.002	0.000	0.002
Subtotal	0.023	0.056	0.079
Total Total	0.128	0.331	0.458

Worksheet 1L Summary Results for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)						
Crash Severity Level	Predicted average crash frequency, N predicted rs (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)						
•	(Total) from Worksheet 1K		(2) / (3)						
Total	0.5	0.09	5.1						
Fatal and injury (FI)	0.1	0.09	1.4						
Property damage only (PDO)	0.3	0.09	3.7						

Worksheet	1A General Inf	formation	and Input D	ata for Urban and Suburba	n Roadway	Segments
General Information						Location Information
Analyst		TL		Roadway	MD 190 River Road	
Agency or Company		ATCS		Roadway Section		I-495 NB Terminal to Burdette Rd
Date Performed	1	12/07/21		Jurisdiction		Montgomery County
				Analysis Year		2045
Input Data				Base Conditions		Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)						4D
Length of segment, L (mi)						0.08
AADT (veh/day)	AADT _{MAX} =	66,000	(veh/day)			55,443
Type of on-street parking (none/parallel/angle)				None		None
Proportion of curb length with on-street parking						0
Median width (ft) - for divided only				15		20
Lighting (present / not present)				Not Present		Present
Auto speed enforcement (present / not present)				Not Present		Not Present
Major commercial driveways (number)						0
Minor commercial driveways (number)						0
Major industrial / institutional driveways (number)						0
Minor industrial / institutional driveways (number)						0
Major residential driveways (number)						0
Minor residential driveways (number)						0
Other driveways (number)						0
Speed Category						Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)				0		25
Offset to roadside fixed objects (ft) [If greater than 30 or Not Pr	esent, input 30]			30		5
Calibration Factor, Cr				1.00		1.00

	Worksheet 1B Crash Modification Factors for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)					
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF					
CMF 1r	CMF 2r	CMF 3r	CMF 4r	CMF 5r	CMF comb					
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)					
1.00	1.08	0.99	0.91	1.00	0.98					

			e-Vehicle Nondriveway Co	ollisions by Severity Level	tor Urban and Suburba		egments	(2)	(2)
(1)	(2	2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
-			Parameter, k	Initial N _{brmv}	Crashes	N_{brmv}	CMFs	Factor, Cr	N _{brmv}
	from Ta	ble 12-3	from Table 12-3	from Equation 12-10	(4) _{TOTAL}	(4) _{TOTAL} *(5)	(6) from	(6)*(7)*	(6)*(7)*(8)
	а	b				(')IOIAL (')	Worksheet 1B		(-) (-) (-)
Total	-12.34	1.36	1.32	0.990	1.000	0.990	0.98	1.00	0.970
Fatal and Injury (FI)	-12.76	1.28	1.31	0.271	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.258	0.98	1.00	0.253
- attai and injury (i i)	12.70	1.20	1.01	0.211	0.261	0.200	0.00	1.00	0.200
Property Demana Only (PDO)	-12.81	1.38	1.34	0.770	(5) _{TOTAL} -(5) _{FI}	0.732	0.00	1.00	0.717
Property Damage Only (PDO)	-12.81	1.38	1.34	0.770	0.739	0.732	0.98	1.00	0.717

(4)	orksheet 1D Multiple-Vehicle No	(+)	Comsion Type for Orban an	(E)		
(1) Collision Type	Proportion of Collision Type(FI)	(3) Predicted N brmv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N brmv (PDO) (crashes/year)	(6) Predicted N _{brmv (TOTAL)} (crashes/year	
	from Table 12-4	(9)FI from Worksheet 1C	from Table 12-4	(9)PDO from Worksheet 1C	(9)TOTAL from Worksheet 1C	
Total	1.000	0.253	1.000	0.717	0.970	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Rear-end collision	0.832	0.210	0.662	0.475	0.685	
Head-on collision	0.020	0.005	0.007	0.005	0.010	
Angle collision	0.040	0.010	0.036	0.026	0.036	
Sideswipe, same direction	0.050	0.013	0.223	0.160	0.173	
Sideswipe, opposite direction	0.010	0.003	0.001	0.001	0.003	
Other multiple-vehicle collision	0.048	0.012	0.071	0.051	0.063	

	Worksheet 1E Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments									
(1)	(2	2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
Crash Severity Level			Parameter, k	Initial N _{brsv}	Crashes	N_{brsv}	CMFs	Factor, Cr	N _{brsv}	
from Table		ble 12-5	from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)	
	а	b	110111 14010 12 0	nom Equation 12 10		(')TOTAL (")	Worksheet 1B		(0) (1) (0)	
Total	-5.05	0.47	0.86	0.087	1.000	0.087	0.98	1.00	0.085	
Fatal and Injury (FI)	-8.71	0.66	0.28	0.018	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.018	0.98	1.00	0.017	
- attai and injury (i i)	0.7 1	0.00	0.20	0.010	0.202	0.010	0.00	1.00	0.017	
Property Damage Only (PDO)	-5.04	0.45	1.06	0.071	(5) _{TOTAL} -(5) _{FI}	0.069	0.98	1.00	0.068	
Froperty Damage Only (FDO)	-5.04	0.45	1.00	0.07 1	0.798	0.009	0.96	1.00	0.000	

(1)	Worksheet 1F Single-Vehi	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N brsv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N brsv (PDO) (crashes/year)	Predicted N _{brsv (TOTAL)} (crashes/year)
	from Table 12-6	(9)FI from Worksheet 1E	from Table 12-6	(9)PDO from Worksheet 1E	(9)TOTAL from Worksheet 1E
Total	1.000	0.017	1.000	0.068	0.085
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.001	0.000	0.063	0.004	0.004
Collision with fixed object	0.500	0.009	0.813	0.055	0.064
Collision with other object	0.028	0.000	0.016	0.001	0.002
Other single-vehicle collision	0.471	0.008	0.108	0.007	0.015

Work	sheet 1G Multiple-Vehicle Drive	way-Related Collisions by	y Driveway Type for Urban	and Suburban Roadway Segments	
(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	Number of driveways,	Crashes per driveway per year, N _j	Coefficient for traffic adjustment, t	Initial N _{brdwy}	Overdispersion parameter, k
	n _j	from Table 12-7	from Table 12-7	Equation 12-16	from Table 12-7
	-	iloiii lable 12-7		n _j * N _j * (AADT/15,000) ^t	IIOIII Table 12-7
Major commercial	0	0.033	1.106	0.000	
Minor commercial	0	0.011	1.106	0.000	
Major industrial/institutional	0	0.036	1.106	0.000	
Minor industrial/institutional	0	0.005	1.106	0.000	
Major residential	0	0.018	1.106	0.000	
Minor residential	0	0.003	1.106	0.000	
Other	0	0.005	1.106	0.000	
Total				0.000	1.39

Worksheet 1H Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	
Crash Severity Level	Initial N _{brdwy}	Proportion of total crashes (f _{dwy})	Adjusted N _{brdwy}	Combined CMFs	Calibration factor, C,	Predicted N _{brdwy}	
	(5) _{TOTAL} from Worksheet 1G	from Table 12-7	(2) _{TOTAL} * (3)	(6) from Worksheet 1B	, ,	(4)*(5)*(6)	
Total	0.000	1.000	0.000	0.98	1.00	0.000	
Fatal and injury (FI)		0.284	0.000	0.98	1.00	0.000	
Property damage only (PDO)		0.716	0.000	0.98	1.00	0.000	

	Worksheet 1I Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(8)*		
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{pedr}	Predicted N _{pedr}		
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8	(5)*(6)		
Total	0.970	0.085	0.000	1.056	0.019	0.020		
Fatal and injury (FI)						0.020		

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-19

	Worksheet 1J Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(8)*		
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{biker}	Predicted N _{biker}		
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9	(5)*(6)		
Total	0.970	0.085	0.000	1.056	0.005	0.005		
Fatal and injury (FI)						0.005		

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-20

(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Na 111-1 4	(3) from Worksheet 1D and 1F;	(5) from Worksheet 1D and 1F; and	(6) from Worksheet 1D and 1F;
Collision type	(7) from Worksheet 1H; and	(7) from Worksheet 1H	(7) from Worksheet 1H; and
	(8) from Worksheet 1I and 1J		(8) from Worksheet 1I and 1J
	MULTIPLE-VEHICLE	•	
Rear-end collisions (from Worksheet 1D)	0.210	0.475	0.685
Head-on collisions (from Worksheet 1D)	0.005	0.005	0.010
Angle collisions (from Worksheet 1D)	0.010	0.026	0.036
Sideswipe, same direction (from Worksheet 1D)	0.013	0.160	0.173
Sideswipe, opposite direction (from Worksheet 1D)	0.003	0.001	0.003
Oriveway-related collisions (from Worksheet 1H)	0.000	0.000	0.000
Other multiple-vehicle collision (from Worksheet 1D)	0.012	0.051	0.063
Subtotal	0.253	0.717	0.970
	SINGLE-VEHICLE		
Collision with animal (from Worksheet 1F)	0.000	0.004	0.004
Collision with fixed object (from Worksheet 1F)	0.009	0.055	0.064
Collision with other object (from Worksheet 1F)	0.000	0.001	0.002
Other single-vehicle collision (from Worksheet 1F)	0.008	0.007	0.015
Collision with pedestrian (from Worksheet 1I)	0.020	0.000	0.020
Collision with bicycle (from Worksheet 1J)	0.005	0.000	0.005
Subtotal	0.043	0.068	0.111
- Total	0.295	0.785	1.081

Worksheet 1L Summary Results for Urban and Suburban Roadway Segments							
(1)	(2)	(2)					
Crash Severity Level	Predicted average crash frequency, N predicted rs (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)				
	(Total) from Worksheet 1K		(2) / (3)				
Total	1.1	0.08	13.5				
Fatal and injury (FI)	0.3	0.08	3.7				
Property damage only (PDO)	0.8	0.08	9.8				

Works	heet 2A General Information and Inpu	t Data for Urban and Suburban A	Arterial Intersections	
General Informa	tion		Location Information	
Analyst	TL	Roadway	MD 190 River Road	
Agency or Company	ATCS	Intersection	At Burdette Road	
Date Performed	12/07/21	Jurisdiction	Montgomery County	
		Analysis Year	2045	
Input Data		Base Conditions	Site Conditions	
Intersection type (3ST, 3SG, 4ST, 4SG)			4SG	
AADT _{major} (veh/day)	$AADT_{MAX} = 67,700 (veh/day)$		55,069	
AADT _{minor} (veh/day)	$AADT_{MAX} = 33,400$ (veh/day)		4,379	
Intersection lighting (present/not present)	-	Not Present	Present	
Calibration factor, C _i		1.00	1.00	
Data for unsignalized intersections only:				
Number of major-road approaches with left-turn land	es (0,1,2)	0	0	
Number of major-road approaches with right-turn la	nes (0,1,2)	0	0	
Data for signalized intersections only:				
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	2	
Number of approaches with right-turn lanes (0,1,2,3	,4) [for 3SG, use maximum value of 3]	0	2	
Number of approaches with left-turn signal phasing	[for 3SG, use maximum value of 3]		2	
Type of left-turn signal phasing for Leg #1		Permissive	Permissive / Protected	
Type of left-turn signal phasing for Leg #2			Permissive / Protected	
Type of left-turn signal phasing for Leg #3			Permissive	
Type of left-turn signal phasing for Leg #4 (if application)	ible)		Permissive	
Number of approaches with right-turn-on-red prohib	ited [for 3SG, use maximum value of 3]	0	0	
Intersection red light cameras (present/not present)		Not Present	Not Present	
Sum of all pedestrian crossing volumes (PedVol)			140	
Maximum number of lanes crossed by a pedestrian	(Idiresk)		7	
Number of bus stops within 300 m (1,000 ft) of the in		0	3	
Schools within 300 m (1,000 ft) of the intersection (p		Not Present	Not Present	
Number of alcohol sales establishments within 300	m (1,000 ft) of the intersection	0	0	

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections								
(1)	(2)	(3)	(4)	(5)	(6)	(7)			
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF			
	Phasing								
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}			
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)			
0.81	0.98	0.92	1.00	0.91	1.00	0.67			

	Worksheet 2C Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections										
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
Crash Severity Level	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
-	from Table 40.40		Parameter, k	Initial N _{bimv}	Crashes	N _{bimv}	CMFs	Factor, C _i	N_{bimv}		
from Table 12-10		0	from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from	Ī [(6)*(7)*(8)		
	а	b	С	IIOIII Table 12-10	21	(+)TOTAL (5)		Worksheet 2B		(0) (1) (0)	
Total	-10.99	1.07	0.23	0.39	13.721	1.000	13.721	0.67	1.00	9.142	
Estal and Injuny (EI)	-13.14	1.18	0.22	0.33	4.884	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	5.049	0.67	1.00	3.364	
Fatal and Injury (FI)	-13.14	1.10	0.22	0.33	4.004	0.368	5.049	0.07	1.00	3.304	
Property Damage Only	44.00	4.00	0.04	2.44	0.000	(5) _{TOTAL} -(5) _{FI}	0.070	0.07	4.00	5 770	
(PDO)	-11.02	1.02	0.24	0.44	8.389	0.632	8.673	0.67	1.00	5.779	

	Worksheet 2D Multiple-	Vehicle Collisions by Collis	sion Type for Urban and Suburb	an Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bimv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv} (TOTAL) (crashes/year)
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C
Total	1.000	3.364	1.000	5.779	9.142
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.450	1.514	0.483	2.791	4.305
Head-on collision	0.049	0.165	0.030	0.173	0.338
Angle collision	0.347	1.167	0.244	1.410	2.577
Sideswipe	0.099	0.333	0.032	0.185	0.518
Other multiple-vehicle collision	0.055	0.185	0.211	1.219	1.404

		Worksheet	2E Single-\	ehicle Collisions by Severi	ty Level for Urban	and Suburban Arterial In	tersections			
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
				Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}
Crash Severity Level	fr	om Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)
	a	h	С	` '	(FI) from Eqn. 12-		(4)TOTAL (0)	Worksheet 2B		(0) (1) (0)
	а	b	J		24 or 12-27					
Total	-10.21	0.68	0.27	0.36	0.593	1.000	0.593	0.67	1.00	0.395
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.119	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.118	0.67	1.00	0.078
Fatai and injury (Fi)	-9.25	0.43	0.29	0.09	0.119	0.199	0.116	0.07	1.00	0.076
Property Damage Only	44.04	0.70	0.05	0.44	0.400	(5) _{TOTAL} -(5) _{FI}	0.475	0.07	4.00	0.047
(PDO)	-11.34	0.78	0.25	0.44	0.482	0.801	0.475	0.67	1.00	0.317

	Worksheet 2F Single-V	ehicle Collisions by Collis	ion Type for Urban and Suburba	n Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bisv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv} (TOTAL) (crashes/year)
	from Table 12-13	(9) _{FI} from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.078	1.000	0.317	0.395
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.001	0.001
Collision with fixed object	0.744	0.058	0.870	0.275	0.334
Collision with other object	0.072	0.006	0.070	0.022	0.028
Other single-vehicle collision	0.040	0.003	0.023	0.007	0.010
Single-vehicle noncollision	0.141	0.011	0.034	0.011	0.022

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections								
(1) (2) (3) (4) (5) (7)*								
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}			
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)			
Total								
Fatal and injury (FI)				-				

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections								
(1)	(1) (2) (3) (4)								
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF						
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CiviF						
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)						
4.15	1.00	1.00	4.15						

Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections										
(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	SPF Coefficients					Overdispersion	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}
Crash Seventy Level		from Table 12-14					from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)
	а	b	С	d	е		Hom Equation 12-29	(4) HOIH WORKSHEEL ZIT		(4) (3) (0)
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.037	4.15	1.00	0.155
Fatal and Injury (FI)							1		1.00	0.155

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections									
(1)	(2) (3) (4) (5) (7)*								
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}				
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)				
Total	9.142	0.395	9.537	0.015	0.143				
Fatal and injury (FI)		-		-	0.143				

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksr	neet 2K Crash Severity Distribution for Urban a	nd Suburban Arterial Intersections	
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE	·	• • •
Rear-end collisions (from Worksheet 2D)	1.514	2.791	4.305
Head-on collisions (from Worksheet 2D)	0.165	0.173	0.338
Angle collisions (from Worksheet 2D)	1.167	1.410	2.577
Sideswipe (from Worksheet 2D)	0.333	0.185	0.518
Other multiple-vehicle collision (from Worksheet 2D)	0.185	1.219	1.404
Subtotal	3.364	5.779	9.142
	SINGLE-VEHICLE		•
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.001	0.001
Collision with fixed object (from Worksheet 2F)	0.058	0.275	0.334
Collision with other object (from Worksheet 2F)	0.006	0.022	0.028
Other single-vehicle collision (from Worksheet 2F)	0.003	0.007	0.010
Single-vehicle noncollision (from Worksheet 2F)	0.011	0.011	0.022
Collision with pedestrian (from Worksheet 2G or 2I)	0.155	0.000	0.155
Collision with bicycle (from Worksheet 2J)	0.143	0.000	0.143
Subtotal	0.376	0.317	0.693
Total	3.740	6.095	9.835

Worksheet 2L Summary Results for Urban and Suburban Arterial Intersections						
(1)	(2)					
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)					
	(Total) from Worksheet 2K					
Total	9.8					
Fatal and injury (FI)	3.7					
Property damage only (PDO)	6.1					

	Worksheet 2A General Information and Input	Data for Orban and Suburban Arte	
	Information		Location Information
Analyst	TL	Roadway	MD 190 River Road
Agency or Company	ATCS	Intersection	At I-495 ML Ramps
Date Performed	12/08/21	Jurisdiction	Montgomery County
		Analysis Year	2045
	ut Data	Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)	AADT		4SG
AADT _{major} (veh/day)	$AADT_{MAX} = 67,700 (veh/day)$		45,190
AADT _{minor} (veh/day)	$AADT_{MAX} = 33,400 (veh/day)$	-	9,011
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C _i		1.00	1.00
Data for unsignalized intersections only:			
Number of major-road approaches with left	-turn lanes (0,1,2)	0	0
Number of major-road approaches with right	nt-turn lanes (0,1,2)	0	0
Data for signalized intersections only:			
Number of approaches with left-turn lanes	(0,1,2,3,4) [for 3SG, use maximum value of 3]	0	4
Number of approaches with right-turn lanes	s (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	4
Number of approaches with left-turn signal	phasing [for 3SG, use maximum value of 3]		4
Type of left-turn signal phasing for Leg #1		Permissive	Protected
Type of left-turn signal phasing for Leg #2			Protected
Type of left-turn signal phasing for Leg #3			Protected
Type of left-turn signal phasing for Leg #4 ((if applicable)		Protected
Number of approaches with right-turn-on-re	ed prohibited [for 3SG, use maximum value of 3]	0	0
Intersection red light cameras (present/not		Not Present	Not Present
Sum of all pedestrian crossing volumes (P	edVol) Signalized intersections only		140
Maximum number of lanes crossed by a pe	edestrian (n _{lanesx})		9
Number of bus stops within 300 m (1,000 ft	,	0	0
Schools within 300 m (1,000 ft) of the inters	\1 /	Not Present	Not Present
Number of alcohol sales establishments wi	thin 300 m (1,000 ft) of the intersection	0	0

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections							
(1)	(2)	(3)	(4)	(5)	(6)	(7)		
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF		
	Phasing							
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}		
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)		
0.66	0.78	0.85	1.00	0.91	1.00	0.40		

		Worksheet	2C Multiple-	Vehicle Collisions by Sever	rity Level for Urban	and Suburban Arterial I	ntersections			
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
				Parameter, k	Initial N _{bimv}	Crashes	N _{bimv}	CMFs	Factor, C _i	N_{bimv}
	fr	om Table 12-1	0	from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)
	а	b	С	IIOIII Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)
Total	-10.99	1.07	0.23	0.39	13.110	1.000	13.110	0.40	1.00	5.225
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	4.533	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	4.684	0.40	1.00	1.867
Fatai and injury (Fi)	-13.14	1.10	0.22	0.33	4.000	0.357	4.004	0.40	1.00	1.007
Property Damage Only	44.00	4.00	0.04	0.44	0.454	(5) _{TOTAL} -(5) _{FI}	0.400	0.40	4.00	0.050
(PDO)	-11.02	1.02	0.24	0.44	8.154	0.643	8.426	0.40	1.00	3.358

(1)	(2)	(3)	sion Type for Urban and Suburb	(5)	(6)
Collision Type	Proportion of Collision Type(FI)	Predicted N bimv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv (TOTAL)} (crashes/year)
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C
Total	1.000	1.867	1.000	3.358	5.225
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.450	0.840	0.483	1.622	2.462
Head-on collision	0.049	0.091	0.030	0.101	0.192
Angle collision	0.347	0.648	0.244	0.819	1.467
Sideswipe	0.099	0.185	0.032	0.107	0.292
Other multiple-vehicle collision	0.055	0.103	0.211	0.709	0.811

		Worksheet	2E Single-\	ehicle Collisions by Severi	ity Level for Urban	and Suburban Arterial In	tersections					
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
	S	SPF Coefficients		SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
			Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}			
Crash Severity Level	fr	om Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from	Ī	(6)*(7)*(8)		
	а	b	С	from Table 12-12	(FI) from Eqn. 12-		(T)TOTAL (U)	Worksheet 2B		(0) (1) (0)		
	а	D	C		24 or 12-27							
Total	-10.21	0.68	0.27	0.36	0.630	1.000	0.630	0.40	1.00	0.251		
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.135	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.135	0.40	1.00	0.054		
ratai and injury (FI)	-9.25	0.43	0.29	0.09	0.133	0.215	0.135	0.40	1.00	0.054		
Property Damage Only	44.04	0.70	0.05	0.44	0.405	(5) _{TOTAL} -(5) _{FI}	0.404	0.40	4.00	0.407		
(PDO)	-11.34	0.78	0.25	0.44	0.495	0.785	0.494	0.40	1.00	0.197		

(1)	(2)	(3)	ion Type for Urban and Suburba (4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N bisv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv (TOTAL)} (crashes/year)
	from Table 12-13	(9) _{FI} from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.054	1.000	0.197	0.251
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.000	0.001
Collision with fixed object	0.744	0.040	0.870	0.171	0.212
Collision with other object	0.072	0.004	0.070	0.014	0.018
Other single-vehicle collision	0.040	0.002	0.023	0.005	0.007
Single-vehicle noncollision	0.141	0.008	0.034	0.007	0.014

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(1) (2) (3) (4) (5) $(7)^*$								
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}				
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total				-					
Fatal and injury (FI)				-					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections								
(1)	(1) (2) (3) (4)								
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF						
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CiviF						
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)						
1.00	1.00	1.00	1.00						

Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections										
(1)		(2)					(4)	(5)	(6)	(7)
Crash Severity Level	SPF Coefficients					Overdispersion	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}
Crash Severity Level		from Table 12-14					from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)
	а	b	С	d	е		IIOIII Equation 12-29	(4) HOIH WORKSHEEL ZIT		(4) (3) (0)
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.050	1.00	1.00	0.050
Fatal and Injury (FI)									1.00	0.050

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections										
(1)	(2)	(2) (3) (4) (5)								
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}					
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)					
Total	5.225	0.251	5.476	0.015	0.082					
Fatal and injury (FI)		-			0.082					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksh	eet 2K Crash Severity Distribution for Urban a	nd Suburban Arterial Intersections	
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE	·	•
Rear-end collisions (from Worksheet 2D)	0.840	1.622	2.462
Head-on collisions (from Worksheet 2D)	0.091	0.101	0.192
Angle collisions (from Worksheet 2D)	0.648	0.819	1.467
Sideswipe (from Worksheet 2D)	0.185	0.107	0.292
Other multiple-vehicle collision (from Worksheet 2D)	0.103	0.709	0.811
Subtotal	1.867	3.358	5.225
	SINGLE-VEHICLE		
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.001
Collision with fixed object (from Worksheet 2F)	0.040	0.171	0.212
Collision with other object (from Worksheet 2F)	0.004	0.014	0.018
Other single-vehicle collision (from Worksheet 2F)	0.002	0.005	0.007
Single-vehicle noncollision (from Worksheet 2F)	0.008	0.007	0.014
Collision with pedestrian (from Worksheet 2G or 2I)	0.050	0.000	0.050
Collision with bicycle (from Worksheet 2J)	0.082	0.000	0.082
Subtotal	0.186	0.197	0.383
Total	2.052	3.555	5.608

Worksheet 2L Summary Resi	Worksheet 2L Summary Results for Urban and Suburban Arterial Intersections						
(1)	(2)						
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)						
	(Total) from Worksheet 2K						
Total	5.6						
Fatal and injury (FI)	2.1						
Property damage only (PDO)	3.6						

Comove	Worksheet 2A General Information and Input	Data for Orban and Suburban Art	
	Information		Location Information
Analyst	TL	Roadway	Montrose Rd
Agency or Company	ATCS	Intersection	At Seven Locks Rd
Date Performed	12/07/21	Jurisdiction	Montgomery County
		Analysis Year	2045
	out Data	Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)			4SG
AADT _{major} (veh/day)	$AADT_{MAX} = 67,700 (veh/day)$		22,376
AADT minor (veh/day)	$AADT_{MAX} = 33,400 (veh/day)$		11,167
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C _i		1.00	1.00
Data for unsignalized intersections only:			
Number of major-road approaches with lef	t-turn lanes (0,1,2)	0	0
Number of major-road approaches with rig	ht-turn lanes (0,1,2)	0	0
Data for signalized intersections only:			-
Number of approaches with left-turn lanes	(0,1,2,3,4) [for 3SG, use maximum value of 3]	0	4
Number of approaches with right-turn lane	s (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	2
Number of approaches with left-turn signal	phasing [for 3SG, use maximum value of 3]		3
Type of left-turn signal phasing for Leg #1		Permissive	Protected
Type of left-turn signal phasing for Leg #2			Protected
Type of left-turn signal phasing for Leg #3			Protected
Type of left-turn signal phasing for Leg #4	(if applicable)		Permissive
	ed prohibited [for 3SG, use maximum value of 3]	0	0
Intersection red light cameras (present/not	present)	Not Present	Not Present
Sum of all pedestrian crossing volumes (F			164
Maximum number of lanes crossed by a pe	(Idiresk)		7
Number of bus stops within 300 m (1,000 f	,	0	4
Schools within 300 m (1,000 ft) of the inter	\(\)	Not Present	Not Present
Number of alcohol sales establishments w	ithin 300 m (1,000 ft) of the intersection	0	0

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections								
(1)	(2)	(3)	(4)	(5)	(6)	(7)			
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF			
	Phasing								
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}			
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)			
0.66	0.83	0.92	1.00	0.91	1.00	0.46			

	Worksheet 2C Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections											
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Crash Severity Level	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted			
-				Parameter, k	Initial N _{bimv}	Crashes	N _{bimv}	CMFs	Factor, C _i	N_{bimv}		
	fr	om Table 12-1	0	from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from	Ī	(6)*(7)*(8)		
	а	b	С	IIOIII Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)		
Total	-10.99	1.07	0.23	0.39	6.492	1.000	6.492	0.46	1.00	2.987		
Fotal and Injuny (FI)	-13.14	1.18	0.22	0.33	2.073	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	2.149	0.46	1.00	0.989		
Fatal and Injury (FI)	-13.14	1.10	0.22	0.33	2.073	0.331	2.149	0.46	1.00	0.969		
Property Damage Only	-11.02	1.02	0.24	0.44	4.191	(5) _{TOTAL} -(5) _{FI}	4.344	0.46	1.00	1.998		
(PDO)	11.02	1.02	U.Z-4	0.44	1.101	0.669	1.544	3.40	1.00	1.550		

	Worksheet 2D Multiple-	Vehicle Collisions by Collis	sion Type for Urban and Suburb	an Arterial Intersections		
(1)	(2)	(3)	(4)	(5)	(6)	
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bimv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv} (TOTAL) (crashes/year)	
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C	
Total	1.000	0.989	1.000	1.998	2.987	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Rear-end collision	0.450	0.445	0.483	0.965	1.410	
Head-on collision	0.049	0.048	0.030	0.060	0.108	
Angle collision	0.347	0.343	0.244	0.488	0.831	
Sideswipe	0.099	0.098	0.032	0.064	0.162	
Other multiple-vehicle collision	0.055	0.054	0.211	0.422	0.476	

		Worksheet	2E Single-\	ehicle Collisions by Severi	ity Level for Urban	and Suburban Arterial In	tersections			
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
			Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}	
Crash Severity Level	fr	om Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)
	а	b	С	from Table 12-12	(FI) from Eqn. 12-		(T)TOTAL (U)	Worksheet 2B		(0) (1) (0)
	а	D	C		24 or 12-27					
Total	-10.21	0.68	0.27	0.36	0.414	1.000	0.414	0.46	1.00	0.190
Fotal and Injury (FI)	-9.25	0.43	0.29	0.09	0.106	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.108	0.46	1.00	0.050
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.100	0.261	0.100	0.46	1.00	0.050
Property Damage Only	44.04	0.70	0.05	0.44	0.000	(5) _{TOTAL} -(5) _{FI}	(5) _{TOTAL} -(5) _{FL}		4.00	0.444
(PDO)	-11.34	0.78	0.25	0.44	0.302	0.739	0.306	0.46	1.00	0.141

	Worksheet 2F Single-V	ehicle Collisions by Collis	ion Type for Urban and Suburba	n Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bisv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv} (TOTAL) (crashes/year)
	from Table 12-13	(9) _{FI} from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.050	1.000	0.141	0.190
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.000	0.000
Collision with fixed object	0.744	0.037	0.870	0.122	0.159
Collision with other object	0.072	0.004	0.070	0.010	0.013
Other single-vehicle collision	0.040	0.002	0.023	0.003	0.005
Single-vehicle noncollision	0.141	0.007	0.034	0.005	0.012

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1) (2) (3) (4) (5) (7									
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	\mathbf{f}_{pedi}	Predicted N _{pedi}				
Crash Severity Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total									
Fatal and injury (FI)		-		-					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections									
(1)	(1) (2) (3) (4)									
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF							
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CiviF							
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)							
4.15	1.00	1.00	4.15							

Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections											
(1)	(2)					(3)	(4)	(5)	(6)	(7)	
Crash Severity Level	SPF Coefficients					Overdispersion	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}	
Crash Severity Level		fı	rom Table 12-1	14		Parameter, k	from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)	
	а	b	С	d	е		IIOIII Equation 12-23	(4) Holli Worksheet 211		(4) (3) (0)	
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.051	4.15	1.00	0.213	
Fatal and Injury (FI)							-		1.00	0.213	

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections									
(1)	(1) (2) (3) (4) (5)								
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}				
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)				
Total	2.987	0.190	3.177	0.015	0.048				
Fatal and injury (FI)				1	0.048				

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

(1)	(2)	(3)	(4)
· · · · · · · · · · · · · · · · · · ·	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE		• •
Rear-end collisions (from Worksheet 2D)	0.445	0.965	1.410
Head-on collisions (from Worksheet 2D)	0.048	0.060	0.108
Angle collisions (from Worksheet 2D)	0.343	0.488	0.831
Sideswipe (from Worksheet 2D)	0.098	0.064	0.162
Other multiple-vehicle collision (from Worksheet 2D)	0.054	0.422	0.476
Subtotal	0.989	1.998	2.987
	SINGLE-VEHICLE		
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 2F)	0.037	0.122	0.159
Collision with other object (from Worksheet 2F)	0.004	0.010	0.013
Other single-vehicle collision (from Worksheet 2F)	0.002	0.003	0.005
Single-vehicle noncollision (from Worksheet 2F)	0.007	0.005	0.012
Collision with pedestrian (from Worksheet 2G or 2I)	0.213	0.000	0.213
Collision with bicycle (from Worksheet 2J)	0.048	0.000	0.048
Subtotal	0.311	0.141	0.451
Total	1.299	2.139	3.438

Worksheet 2L Summary Results for Urban and Suburban Arterial Intersections							
(1)	(2)						
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)						
	(Total) from Worksheet 2K						
Total	3.4						
Fatal and injury (FI)	1.3						
Property damage only (PDO)	2.1						

Worksheet	1A General Ir	nformation	and Input Da	ata for Urban and Suburbar	n Roadway	Segments
General Information			-			Location Information
Analyst		TL		Roadway		Montrose Rd
Agency or Company		ATCS		Roadway Section		Seven Locks Rd to Potomac Ave
Date Performed				Jurisdiction		Montgomery County
				Analysis Year		2045
Input Data				Base Conditions		Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)						4D
Length of segment, L (mi)						0.02
AADT (veh/day)	$AADT_{MAX} =$	66,000	(veh/day)			10,743
Type of on-street parking (none/parallel/angle)				None		None
Proportion of curb length with on-street parking						0
Median width (ft) - for divided only				15		10
Lighting (present / not present)				Not Present		Not Present
Auto speed enforcement (present / not present)				Not Present		Not Present
Major commercial driveways (number)						0
Minor commercial driveways (number)						0
Major industrial / institutional driveways (number)						0
Minor industrial / institutional driveways (number)						1
Major residential driveways (number)						0
Minor residential driveways (number)						0
Other driveways (number)						0
Speed Category		•	•			Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)				0		42
Offset to roadside fixed objects (ft) [If greater than 30 or Not Pro	esent, input 30]			30		15
Calibration Factor, Cr				1.00		1.00

	Worksheet 1B Crash Modification Factors for Urban and Suburban Roadway Segments									
(1)	(2)	(5)	(6)							
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF					
CMF 1r	CMF 2r	CMF 3r	CMF 4r	CMF 5r	CMF comb					
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)					
1.00	1.07	1.01	1.00	1.00	1.08					

	Worksheet 1C Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments									
(1)	(1) (2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
Crash Severity Level	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
			Parameter, k	Initial N _{brmv}	Crashes	N _{brmv}	CMFs	Factor, Cr	N _{brmv}	
	from Table 12-3		from Table 12-3 from Equation 12-10			(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)	
	а	b	IIOIII Table 12-3	ITOTT Equation 12-10		(+)TOTAL (3)	Worksheet 1B		(0) (1) (0)	
Total	-12.34	1.36	1.32	0.027	1.000	0.027	1.08	1.00	0.029	
Fatal and Injury (FI)	-12.76	1.28	1.31	0.008	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.008	1.08	1.00	0.008	
Fatai and injury (Fi)	-12.70	1.20	1.51	0.006	0.294	0.006	1.00	1.00	0.008	
Dranarti Damara Only (DDO)	-12.81	1.38	4.24	0.000	(5) _{TOTAL} -(5) _{FI}	0.019	1.08	1.00	0.020	
Property Damage Only (PDO)	-12.81	1.36	1.34	0.020	0.706	0.019	1.08	1.00	0.020	

Workshe	eet 1D Multiple-Vehicle No	ndriveway Collisions by	Collision Type for Urban ar	id Suburban Roadway Se	egments
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type(FI)	Predicted N brmv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N brmv (PDO) (crashes/year)	Predicted N _{brmv (TOTAL)} (crashes/year)
	from Table 12-4	(9) _{FI} from Worksheet 1C	from Table 12-4	(9)PDO from Worksheet 1C	(9)TOTAL from Worksheet 1C
Total	1.000	0.008	1.000	0.020	0.029
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.832	0.007	0.662	0.013	0.020
Head-on collision	0.020	0.000	0.007	0.000	0.000
Angle collision	0.040	0.000	0.036	0.001	0.001
Sideswipe, same direction	0.050	0.000	0.223	0.005	0.005
Sideswipe, opposite direction	0.010	0.000	0.001	0.000	0.000
Other multiple-vehicle collision	0.048	0.000	0.071	0.001	0.002

	Worksheet 1E Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments									
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
Crash Severity Level			Parameter, k	Initial N _{brsv}	Crashes	N _{brsv}	CMFs	Factor, Cr	N_{brsv}	
Clash Seventy Level	from Ta	ble 12-5	from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)	
	a	b	HOIII TABIC 12-0	Holli Table 12-5		(')IOIAL (O)	Worksheet 1B		(0) (1) (0)	
Total	-5.05	0.47	0.86	0.010	1.000	0.010	1.08	1.00	0.011	
Fatal and Injury (FI)	-8.71	0.66	0.28	0.002	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.002	1.08	1.00	0.002	
ratarana injury (i i)	-0.71	0.00	0.20	0.002	0.152	0.002	1.00	1.00	0.002	
Property Demoge Only (PDO)	-5.04	0.45	1.06	0.008	(5) _{TOTAL} -(5) _{FI}	0.009	1.08	1.00	0.009	
Property Damage Only (PDO)	-5.04	0.45	1.06	0.006	0.848	0.009	1.06	1.00	0.009	

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N brsv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N brsv (PDO) (crashes/year)	Predicted N _{brsv (TOTAL)} (crashes/year)
,	from Table 12-6	(9) _{FI} from Worksheet 1E	from Table 12-6	(9)PDO from Worksheet 1E	(9)TOTAL from Worksheet 1E
Total	1.000	0.002	1.000	0.009	0.011
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.001	0.000	0.063	0.001	0.001
Collision with fixed object	0.500	0.001	0.813	0.007	0.008
Collision with other object	0.028	0.000	0.016	0.000	0.000
Other single-vehicle collision	0.471	0.001	0.108	0.001	0.002

Work	sheet 1G Multiple-Vehicle Drive	way-Related Collisions by	y Driveway Type for Urban	and Suburban Roadway Segments	
(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	Number of driveways,	Crashes per driveway per year, N _j	Coefficient for traffic adjustment, t	Initial N _{brdwy}	Overdispersion parameter, k
	n _i	from Table 12-7	from Table 12-7	Equation 12-16	from Table 12-7
	-	ITOTTI TABLE 12-7	HOIII Table 12-7	n _i * N _i * (AADT/15,000) ^t	IIOIII Table 12-7
Major commercial	0	0.033	1.106	0.000	
Minor commercial	0	0.011	1.106	0.000	
Major industrial/institutional	0	0.036	1.106	0.000	
Minor industrial/institutional	1	0.005	1.106	0.003	
Major residential	0	0.018	1.106	0.000	
Minor residential	0	0.003	1.106	0.000	
Other	0	0.005	1.106	0.000	
Total				0.003	1.39

Worksheet 1H Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	
Crash Severity Level	Initial N _{brdwy}	Proportion of total crashes (f _{dwy})	Adjusted N _{brdwy}	Combined CMFs	Calibration factor, C,	Predicted N _{brdwy}	
	(5) _{TOTAL} from Worksheet 1G	from Table 12-7	(2) _{TOTAL} * (3) (6) from Workshe				
Total	0.003	1.000	0.003	1.08	1.00	0.004	
Fatal and injury (FI)		0.284	0.001	1.08	1.00	0.001	
Property damage only (PDO)		0.716	0.002	1.08	1.00	0.003	

	Worksheet 1I Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(8)*		
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{pedr}	Predicted N _{pedr}		
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8	(5)*(6)		
Total	0.029	0.011	0.004	0.043	0.019	0.001		
Fatal and injury (FI)						0.001		

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-19

	Worksheet 1J Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(8)*		
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{biker}	Predicted N _{biker}		
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9	(5)*(6)		
Total	0.029	0.011	0.004	0.043	0.005	0.000		
Fatal and injury (FI)						0.000		

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-20

	et 1K Crash Severity Distribution for Urban		(0)
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 1D and 1F;	(5) from Worksheet 1D and 1F; and	(6) from Worksheet 1D and 1F;
Sollision type	(7) from Worksheet 1H; and	(7) from Worksheet 1H	(7) from Worksheet 1H; and
	(8) from Worksheet 1I and 1J		(8) from Worksheet 1I and 1J
	MULTIPLE-VEHICLE	•	
Rear-end collisions (from Worksheet 1D)	0.007	0.013	0.020
Head-on collisions (from Worksheet 1D)	0.000	0.000	0.000
Angle collisions (from Worksheet 1D)	0.000	0.001	0.001
Sideswipe, same direction (from Worksheet 1D)	0.000	0.005	0.005
Sideswipe, opposite direction (from Worksheet 1D)	0.000	0.000	0.000
Oriveway-related collisions (from Worksheet 1H)	0.001	0.003	0.004
Other multiple-vehicle collision (from Worksheet 1D)	0.000	0.001	0.002
Subtotal	0.009	0.023	0.032
	SINGLE-VEHICLE		•
Collision with animal (from Worksheet 1F)	0.000	0.001	0.001
Collision with fixed object (from Worksheet 1F)	0.001	0.007	0.008
Collision with other object (from Worksheet 1F)	0.000	0.000	0.000
Other single-vehicle collision (from Worksheet 1F)	0.001	0.001	0.002
Collision with pedestrian (from Worksheet 1I)	0.001	0.000	0.001
Collision with bicycle (from Worksheet 1J)	0.000	0.000	0.000
Subtotal	0.003	0.009	0.012
Total	0.012	0.032	0.044

V	Worksheet 1L Summary Results for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)						
Crash Severity Level	Predicted average crash frequency, N predicted rs (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)						
	(Total) from Worksheet 1K		(2) / (3)						
Total	0.0	0.02	2.2						
Fatal and injury (FI)	0.0	0.02	0.6						
Property damage only (PDO)	0.0	0.02	1.6						

Works	heet 2A General Information and Input	Data for Urban and Suburban A	rterial Intersed	ctions	
General Informa	tion		Locati	ion Information	
Analyst	TL	Roadway		Montrose Rd	
Agency or Company	ATCS	Intersection		At Potomac Ave	
Date Performed	12/07/21	Jurisdiction		Montgomery County	
		Analysis Year		2045	
Input Data		Base Conditions		Site Conditions	
Intersection type (3ST, 3SG, 4ST, 4SG)				4ST	
AADT _{major} (veh/day)	$AADT_{MAX} = 46,800 (veh/day)$			10,965	
AADT minor (veh/day)	$AADT_{MAX} = 5,900$ (veh/day)			3,526	
Intersection lighting (present/not present)		Not Present		Present	
Calibration factor, C _i		1.00		1.00	
Data for unsignalized intersections only:					
Number of major-road approaches with left-turn lane	0		0		
Number of major-road approaches with right-turn la	nes (0,1,2)	0		0	
Data for signalized intersections only:					
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]	0			
Number of approaches with right-turn lanes (0,1,2,3	,4) [for 3SG, use maximum value of 3]	0			
Number of approaches with left-turn signal phasing	[for 3SG, use maximum value of 3]				
Type of left-turn signal phasing for Leg #1		Permissive			
Type of left-turn signal phasing for Leg #2					
Type of left-turn signal phasing for Leg #3					
Type of left-turn signal phasing for Leg #4 (if applica	ble)				
Number of approaches with right-turn-on-red prohib	ited [for 3SG, use maximum value of 3]	0			
Intersection red light cameras (present/not present)		Not Present			
Sum of all pedestrian crossing volumes (PedVol)					
Maximum number of lanes crossed by a pedestrian	(n _{lanesx})				
Number of bus stops within 300 m (1,000 ft) of the in		0			
Schools within 300 m (1,000 ft) of the intersection (p		Not Present			
Number of alcohol sales establishments within 300	m (1,000 ft) of the intersection	0			

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections								
(1)	(2)	(3)	(4)	(5)	(6)	(7)			
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF			
	Phasing								
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}			
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)			
1.00	1.00	1.00	1.00	0.91	0.97	0.89			

	Worksheet 2C Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections											
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Crash Severity Level	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted			
-			Parameter, k	Initial N _{bimv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bimv}			
	fr	om Table 12-1	0	from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from	(6)*(7)*(8)			
	а	b	С	Holli Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)		
Total	-8.90	0.82	0.25	0.40	2.160	1.000	2.160	0.89	1.00	1.915		
Fotal and Injuny (FI)	-11.13	0.93	0.28	0.48	0.826	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.819	0.89	1.00	0.726		
Fatal and Injury (FI)	-11.13	0.93	0.20	0.46	0.020	0.379	0.619	0.89	1.00	0.726		
Property Damage Only	0.74	0.77	0.00	0.40	4.050	(5) _{TOTAL} -(5) _{FI}	4.044	0.00	4.00	4.400		
(PDO)	-8.74	0.77	0.23	0.40	1.352	0.621	1.341	0.89	1.00	1.189		

	Worksheet 2D Multiple-	Vehicle Collisions by Collis	sion Type for Urban and Suburb	an Arterial Intersections		
(1)	(2)	(3)	(4)	(5)	(6)	
Collision Type	Proportion of Collision Type _(FI)	Predicted N bimv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv} (TOTAL) (crashes/year)	
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C	
Total	1.000	0.726	1.000	1.189	1.915	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Rear-end collision	0.338	0.245	0.374	0.445	0.690	
Head-on collision	0.041	0.030	0.030	0.036	0.065	
Angle collision	0.440	0.319	0.335	0.398	0.718	
Sideswipe	0.121	0.088	0.044	0.052	0.140	
Other multiple-vehicle collision	0.060	0.044	0.217	0.258	0.302	

		Worksheet	2E Single-\	/ehicle Collisions by Severi	ty Level for Urban	and Suburban Arterial In	tersections			
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
			Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}	
Crash Severity Level	fr	om Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from	Ī	(6)*(7)*(8)
		b	С	from Table 12-12	(FI) from Eqn. 12-		(T)TOTAL (U)	Worksheet 2B		(0) (1) (0)
	а	b	C		24 or 12-27					
Total	-5.33	0.33	0.12	0.65	0.278	1.000	0.278	0.89	1.00	0.247
Fatal and Injury (FI)					0.078	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.080	0.89	1.00	0.071
ratarand injury (FI)					0.076	0.288	0.000	0.09	1.00	0.071
Property Damage Only	7.04	0.00	0.05	0.54	0.400	(5) _{TOTAL} -(5) _{FI}	0.400	0.00	4.00	0.475
(PDO)	-7.04	0.36	0.25	0.54	0.192	0.712	0.198	0.89	1.00	0.175

(1)	(2)	(3)	ion Type for Urban and Suburba (4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N bisv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv (TOTAL)} (crashes/year)
	from Table 12-13	(9) _{FI} from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.071	1.000	0.175	0.247
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.001	0.000	0.026	0.005	0.005
Collision with fixed object	0.679	0.048	0.847	0.149	0.197
Collision with other object	0.089	0.006	0.070	0.012	0.019
Other single-vehicle collision	0.051	0.004	0.007	0.001	0.005
Single-vehicle noncollision	0.179	0.013	0.049	0.009	0.021

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(1) (2) (3) (4) (5)								
Creak Savarity Laval	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	\mathbf{f}_{pedi}	Predicted N _{pedi}				
Crash Severity Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total	1.915	0.247	2.161	0.022	0.048				
atal and injury (FI)					0.048				

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections									
(1)	(1) (2) (3) (4)									
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF							
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CiviF							
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)							
										

Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections											
(1)	(2)					(3)	(4)	(5)	(6)	(7)	
SPF Coefficients Crash Severity Level					Overdispersion N _{pedbase}		Combined CMF	Calibration	Predicted N _{pedi}		
Crash Severity Level		fı	rom Table 12-1	4		Parameter, k	from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)	
	а	b	С	d	е		Holli Equation 12-29	(4) IIOIII WORKSHEEL ZII		(4) (3) (0)	
Total									1.00		
Fatal and Injury (FI)							1		1.00		

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections									
(1)	(1) (2) (3) (4)								
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}				
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)				
Total	1.915	0.247	2.161	0.018	0.039				
Fatal and injury (FI)				-	0.039				

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksr	neet 2K Crash Severity Distribution for Urban a	nd Suburban Arterial Intersections	
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE	·	•
Rear-end collisions (from Worksheet 2D)	0.245	0.445	0.690
Head-on collisions (from Worksheet 2D)	0.030	0.036	0.065
Angle collisions (from Worksheet 2D)	0.319	0.398	0.718
Sideswipe (from Worksheet 2D)	0.088	0.052	0.140
Other multiple-vehicle collision (from Worksheet 2D)	0.044	0.258	0.302
Subtotal	0.726	1.189	1.915
	SINGLE-VEHICLE	·	
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.005	0.005
Collision with fixed object (from Worksheet 2F)	0.048	0.149	0.197
Collision with other object (from Worksheet 2F)	0.006	0.012	0.019
Other single-vehicle collision (from Worksheet 2F)	0.004	0.001	0.005
Single-vehicle noncollision (from Worksheet 2F)	0.013	0.009	0.021
Collision with pedestrian (from Worksheet 2G or 2I)	0.048	0.000	0.048
Collision with bicycle (from Worksheet 2J)	0.039	0.000	0.039
Subtotal	0.158	0.175	0.333
Total	0.884	1.364	2.248

Worksheet 2L Summary Resul	ts for Urban and Suburban Arterial Intersections
(1)	(2)
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)
	(Total) from Worksheet 2K
Total	2.2
Fatal and injury (FI)	0.9
Property damage only (PDO)	1.4

Worksheet	1A General Ir	nformation	and Input Da	ata for Urban and Suburbar	n Roadway	Segments
General Information						Location Information
Analyst		TL		Roadway		Montrose Rd
Agency or Company		ATCS		Roadway Section		Potomac Ave to Tower Oaks Blvd
Date Performed	erformed 12/07/21			Jurisdiction		Montgomery County
				Analysis Year		2045
Input Data				Base Conditions		Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)						4D
Length of segment, L (mi)						0.45
AADT (veh/day)	$AADT_{MAX} =$	66,000	(veh/day)			42,985
Type of on-street parking (none/parallel/angle)				None		None
Proportion of curb length with on-street parking						0
Median width (ft) - for divided only				15		10
Lighting (present / not present)				Not Present		Present
Auto speed enforcement (present / not present)				Not Present		Not Present
Major commercial driveways (number)						0
Minor commercial driveways (number)						0
Major industrial / institutional driveways (number)						0
Minor industrial / institutional driveways (number)						0
Major residential driveways (number)						0
Minor residential driveways (number)						0
Other driveways (number)						0
Speed Category	•	•				Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)				0		61
Offset to roadside fixed objects (ft) [If greater than 30 or Not Pro	esent, input 30]			30		9
Calibration Factor, Cr				1.00		1.00

Worksheet 1B Crash Modification Factors for Urban and Suburban Roadway Segments								
(1)	(2) (3) (4) (5)							
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF			
CMF 1r	CMF 2r	CMF 3r	CMF 4r	CMF 5r	CMF comb			
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)			
1.00	1.17	1.01	0.91	1.00	1.08			

	Workshee	et 1C Multipl	le-Vehicle Nondriveway Co	ollisions by Severity Level	for Urban and Suburba	n Roadway S	egments		
(1)	(:	2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
			Parameter, k	Initial N _{brmv}	Crashes	N_{brmv}	CMFs	Factor, Cr	N _{brmv}
	from Ta	ble 12-3	from Table 12-3	from Equation 12-10		(4) _{TOTAL} *(5)	(6) from		(6)*/7)*/9)
	а	b	Holli Table 12-3	IIOIII Equation 12-10		(4)TOTAL (3)	Worksheet 1B		(6)*(7)*(8)
Total	-12.34	1.36	1.32	3.938	1.000	3.938	1.08	1.00	4.243
Eatel and Injury (EI)	-12.76	1.28	1.31	1.102	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	1.046	1.08	1.00	1.127
Fatal and Injury (FI)	-12.76	1.20	1.31	1.102	0.266	1.046	1.00	1.00	1.127
Decreets Decrees Only (DDO)	40.04	4.20	4.04	2.047	(5) _{TOTAL} -(5) _{FI}	2.002	1.00	1.00	2.446
Property Damage Only (PDO)	-12.81	1.38	1.34	3.047	0.734	2.892	1.08	1.00	3.116

(1)	(2)	(3)	(4)	(5)	(6)	
Collision Type	Proportion of Collision Type _(FI)	Predicted N brmv (FI) Proportion of Collisio (crashes/year) Type (PDO)		Predicted N brmv (PDO) (crashes/year)	Predicted N _{brmv (TOTAL)} (crashes/yea	
	from Table 12-4	(9)FI from Worksheet 1C	from Table 12-4	(9)PDO from Worksheet 1C	(9)TOTAL from Worksheet 1C	
Total	1.000	1.127	1.000	3.116	4.243	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Rear-end collision	0.832	0.938	0.662	2.063	3.001	
Head-on collision	0.020	0.023	0.007	0.022	0.044	
Angle collision	0.040	0.045	0.036	0.112	0.157	
Sideswipe, same direction	0.050	0.056	0.223	0.695	0.751	
Sideswipe, opposite direction	0.010	0.011	0.001	0.003	0.014	
Other multiple-vehicle collision	0.048	0.054	0.071	0.221	0.275	

	W	orksheet 1E -	- Single-Vehicle Collisions I	y Severity Level for Urba	an and Suburban Road	way Segments	3		
(1)	(2	2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
Crash Severity Level			Parameter, k	Initial N _{brsv}	Crashes	N _{brsv}	CMFs	Factor, Cr	N _{brsv}
Clasii Severity Level	from Ta	ble 12-5	from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)			(6)*(7)*(8)
	а	b	Hom rable 12-3	Holli Equation 12-13		(+)TOTAL (3)	Worksheet 1B		(0) (1) (0)
Total	-5.05	0.47	0.86	0.434	1.000	0.434	1.08	1.00	0.468
Fatal and Injury (FI)	-8.71	0.66	0.28	0.085	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.084	1.08	1.00	0.090
i atai and injury (i i)	-0.71	0.00	0.20	0.005	0.193	0.004	1.00	1.00	0.090
Property Democra Only (PDO)	-5.04	0.45	1.06	0.254	(5) _{TOTAL} -(5) _{FI}	0.350	1.08	1.00	0.377
Property Damage Only (PDO)	-5.04	0.45	1.00	0.354	0.807	0.350	1.08	1.00	0.377

	Worksheet 1F Single-Vehic	cle Collisions by Collisior	n Type for Urban and Subu	rban Roadway Segments	
(1)	(2)	(3)	(4)	(5)	(6)
	Proportion of Collision	Predicted N brsv (FI)	Proportion of Collision	Predicted N brsv (PDO)	
	Type _(FI)	(crashes/year)	Type _(PDO)	(crashes/year)	Predicted N _{brsv (TOTAL)} (crashes/year)
Collision Type					
	from Table 12-6	(9)FI from Worksheet 1E	from Table 12-6	(9)PDO from Worksheet	(9)TOTAL from Worksheet 1E
		` '		1E	
Total	1.000	0.090	1.000	0.377	0.468
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.001	0.000	0.063	0.024	0.024
Collision with fixed object	0.500	0.045	0.813	0.307	0.352
Collision with other object	0.028	0.003	0.016	0.006	0.009
Other single-vehicle collision	0.471	0.043	0.108	0.041	0.083

Workshee	t 1G Multiple-Vehicle Drive	way-Related Collisions by	y Driveway Type for Urban	and Suburban Roadway Segments		
(1)	(2)	(3)	(4)	(5)	(6)	
Driveway Type	Number of driveways,	Crashes per driveway per year, N _j	Coefficient for traffic adjustment, t	Initial N _{brdwy}	Overdispersion parameter, k	
Driveway Type	n _i	from Table 12-7	from Table 12-7	Equation 12-16	from Table 12-7	
	·	ITOTTI TADIE 12-7	ITOTTI TABLE 12-7	n _j * N _j * (AADT/15,000) ^t	nom rable 12-7	
Major commercial	0	0.033	1.106	0.000		
Minor commercial	0	0.011	1.106	0.000		
Major industrial/institutional	0	0.036	1.106	0.000		
Minor industrial/institutional	0	0.005	1.106	0.000		
Major residential	0	0.018	1.106	0.000		
Minor residential	0	0.003	1.106	0.000		
Other	0	0.005	1.106	0.000		
Total				0.000	1.39	

Worksheet	Worksheet 1H Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(7)			
Crash Severity Level	Initial N _{brdwy}	Proportion of total crashes (f _{dwy})	Adjusted N _{brdwy}	Combined CMFs	Calibration factor, C,	Predicted N _{brdwy}			
	(5) _{TOTAL} from Worksheet 1G	from Table 12-7	(2) _{TOTAL} * (3)	(6) from Worksheet 1B	, ,	(4)*(5)*(6)			
Total	0.000	1.000	0.000	1.08	1.00	0.000			
Fatal and injury (FI)		0.284	0.000	1.08	1.00	0.000			
Property damage only (PDO)		0.716	0.000	1.08	1.00	0.000			

	Worksheet 1I Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(8)*			
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{pedr}	Predicted N _{pedr}			
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8	(5)*(6)			
Total	4.243	0.468	0.000	4.711	0.019	0.090			
atal and injury (FI)						0.090			

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-19

	Worksheet 1J Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(8)*			
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{biker}	Predicted N _{biker}			
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9	(5)*(6)			
Total	4.243	0.468	0.000	4.711	0.005	0.024			
Fatal and injury (FI)						0.024			

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-20

(1)	(2)	(3)	(4)
(1)	Fatal and injury (FI)	Property damage only (PDO)	Total
	(3) from Worksheet 1D and 1F;	(5) from Worksheet 1D and 1F; and	(6) from Worksheet 1D and 1F;
Collision type	(7) from Worksheet 1H; and	(7) from Worksheet 1H	(7) from Worksheet 1H; and
	(8) from Worksheet 1I and 1J	(,)	(8) from Worksheet 1I and 1J
	MULTIPLE-VEHICLE		(6)
Rear-end collisions (from Worksheet 1D)	0.938	2.063	3.001
Head-on collisions (from Worksheet 1D)	0.023	0.022	0.044
Angle collisions (from Worksheet 1D)	0.045	0.112	0.157
Sideswipe, same direction (from Worksheet 1D)	0.056	0.695	0.751
Sideswipe, opposite direction (from Worksheet 1D)	0.011	0.003	0.014
Driveway-related collisions (from Worksheet 1H)	0.000	0.000	0.000
Other multiple-vehicle collision (from Worksheet 1D)	0.054	0.221	0.275
Subtotal	1.127	3.116	4.243
	SINGLE-VEHICLE		
Collision with animal (from Worksheet 1F)	0.000	0.024	0.024
Collision with fixed object (from Worksheet 1F)	0.045	0.307	0.352
Collision with other object (from Worksheet 1F)	0.003	0.006	0.009
Other single-vehicle collision (from Worksheet 1F)	0.043	0.041	0.083
Collision with pedestrian (from Worksheet 1I)	0.090	0.000	0.090
Collision with bicycle (from Worksheet 1J)	0.024	0.000	0.024
Subtotal	0.203	0.377	0.581
Total Total	1.331	3.493	4.824

Worksheet 1L Summary Results for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)				
Crash Severity Level	Predicted average crash frequency, N predicted rs (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)				
	(Total) from Worksheet 1K		(2) / (3)				
Total	4.8	0.45	10.7				
Fatal and injury (FI)	1.3	0.45	3.0				
Property damage only (PDO)	3.5	0.45	7.8				

0	Worksheet 2A General Information and Inpureral Information		
			Location Information
Analyst	TL	Roadway	Montrose Rd
Agency or Company	ATCS	Intersection	At Tower Oaks Blvd
Date Performed	12/07/21	Jurisdiction	Montgomery County
		Analysis Year	2045
	Input Data	Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)	AADT		3SG
AADT _{major} (veh/day)	$AADT_{MAX} = 58,100 (veh/day)$		69,942
AADT _{minor} (veh/day)	$AADT_{MAX} = 16,400 (veh/day)$		11,638
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C _i		1.00	1.00
Data for unsignalized intersections only:			
Number of major-road approaches with	left-turn lanes (0,1,2)	0	0
Number of major-road approaches with	right-turn lanes (0,1,2)	0	0
Data for signalized intersections only:			
Number of approaches with left-turn lan	es (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	2
Number of approaches with right-turn la	nes (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	2
Number of approaches with left-turn sig	nal phasing [for 3SG, use maximum value of 3]		2
Type of left-turn signal phasing for Leg	#1	Permissive	Permissive / Protected
Type of left-turn signal phasing for Leg	#2		Protected
Type of left-turn signal phasing for Leg	#3		Not Applicable
Type of left-turn signal phasing for Leg	#4 (if applicable)		Not Applicable
Number of approaches with right-turn-o	n-red prohibited [for 3SG, use maximum value of 3]	0	1
Intersection red light cameras (present/		Not Present	Not Present
	(PedVol) Signalized intersections only		6
Maximum number of lanes crossed by a	a pedestrian (n _{lanesx})		6
Number of bus stops within 300 m (1,00	,	0	4
Schools within 300 m (1,000 ft) of the in		Not Present	Not Present
Number of alcohol sales establishments	s within 300 m (1,000 ft) of the intersection	0	0

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections								
(1)	(2)	(3)	(4)	(5)	(6)	(7)			
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF			
	Phasing								
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}			
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)			
0.86	0.93	0.92	0.98	0.91	1.00	0.66			

	Worksheet 2C Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections											
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Crash Severity Level	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
-				Parameter, k	Initial N _{bimv}	Crashes	N _{bimv}	CMFs	Factor, C _i	N_{bimv}		
	fr	om Table 12-1	0	from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from	1	(6)*(7)*(8)		
	а	b	С	ITOTTI TABLE 12-10	21		(4)TOTAL (3)	Worksheet 2B				
Total	-12.13	1.11	0.26	0.33	14.682	1.000	14.682	0.66	1.00	9.665		
Fotol and Injury (FI)	-11.58	1.02	0.17	0.30	4.015	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	4.057	0.66	1.00	2.802		
Fatal and Injury (FI)	-11.50	1.02	0.17	0.30	4.015	0.290	4.257	0.00		2.802		
Property Damage Only	40.04	4.44	0.00	0.00	0.000	(5) _{TOTAL} -(5) _{FI}	40.405	0.00	4.00	0.000		
(PDO)	-13.24	1.14	0.30	0.36	9.833	0.710	10.425	0.66	1.00	6.863		

	Worksheet 2D Multiple-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections								
(1)	(2)	(3)	(4)	(5)	(6)				
Collision Type	Proportion of Collision Type(FI)	Predicted N bimv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv (TOTAL)} (crashes/year)				
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C				
Total	1.000	2.802	1.000	6.863	9.665				
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)				
Rear-end collision	0.549	1.538	0.546	3.747	5.285				
Head-on collision	0.038	0.106	0.020	0.137	0.244				
Angle collision	0.280	0.785	0.204	1.400	2.185				
Sideswipe	0.076	0.213	0.032	0.220	0.433				
Other multiple-vehicle collision	0.057	0.160	0.198	1.359	1.519				

		Worksheet	2E Single-\	ehicle Collisions by Severi	ty Level for Urban	and Suburban Arterial In	tersections			
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
			Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}	
Crash Severity Level	fr	om Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)
	а	b	С	from Table 12-12 (F	(FI) from Eqn. 12-		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)
	а	D	· ·		24 or 12-27					
Total	-9.02	0.42	0.40	0.36	0.554	1.000	0.554	0.66	1.00	0.365
Fatal and Injury (FI)	-9.75	0.27	0.51	0.24	0.140	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.150	0.66	1.00	0.099
ratarand injury (FI)	-9.75	0.27	0.51	0.24	0.140	0.270	0.150		1.00	0.099
Property Damage Only	0.00	0.45	0.22	0.52	0.270	(5) _{TOTAL} -(5) _{FI}	0.404	0.66	4.00	0.000
(PDO)	-9.08	0.45	0.33	0.53	0.379	0.730			1.00	0.266

(1)	(2)	(3)	ion Type for Urban and Suburba (4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N bisv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv (TOTAL)} (crashes/year)
	from Table 12-13	(9) _{FI} from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.099	1.000	0.266	0.365
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.001	0.000	0.003	0.001	0.001
Collision with fixed object	0.653	0.064	0.895	0.238	0.303
Collision with other object	0.091	0.009	0.069	0.018	0.027
Other single-vehicle collision	0.045	0.004	0.018	0.005	0.009
Single-vehicle noncollision	0.209	0.021	0.014	0.004	0.024

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections										
(1)	(1) (2) (3) (4) (5)									
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}					
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)					
Total				-						
Fatal and injury (FI)				-						

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections								
(1)	(1) (2) (3) (4)								
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF						
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CiviF						
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)						
4.15	1.00	1.00	4.15						

Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections										
(1)		(2)					(4)	(5)	(6)	(7)
Crash Severity Level	SPF Coefficients					Overdispersion	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}
Clash Severity Level		fı	om Table 12-1	4		Parameter, k	from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)
	а	b	С	d	е		Hom Equation 12 25	(4) Holli Wolkshoot 211		(4) (0) (0)
Total	-6.60	0.05	0.24	0.41	0.09	0.52	0.006	4.15	1.00	0.023
Fatal and Injury (FI)		-							1.00	0.023

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections								
(1)	(2)	(2) (3) (4) (5)						
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}			
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)			
Total	9.665	0.365	10.030	0.011	0.110			
Fatal and injury (FI)					0.110			

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksh	Worksheet 2K Crash Severity Distribution for Urban and Suburban Arterial Intersections								
(1)	(2)	(3)	(4)						
	Fatal and injury (FI)	Property damage only (PDO)	Total						
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;						
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J						
	MULTIPLE-VEHICLE								
Rear-end collisions (from Worksheet 2D)	1.538	3.747	5.285						
Head-on collisions (from Worksheet 2D)	0.106	0.137	0.244						
Angle collisions (from Worksheet 2D)	0.785	1.400	2.185						
Sideswipe (from Worksheet 2D)	0.213	0.220	0.433						
Other multiple-vehicle collision (from Worksheet 2D)	0.160	1.359	1.519						
Subtotal	2.802	6.863	9.665						
	SINGLE-VEHICLE								
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000						
Collision with animal (from Worksheet 2F)	0.000	0.001	0.001						
Collision with fixed object (from Worksheet 2F)	0.064	0.238	0.303						
Collision with other object (from Worksheet 2F)	0.009	0.018	0.027						
Other single-vehicle collision (from Worksheet 2F)	0.004	0.005	0.009						
Single-vehicle noncollision (from Worksheet 2F)	0.021	0.004	0.024						
Collision with pedestrian (from Worksheet 2G or 2I)	0.023	0.000	0.023						
Collision with bicycle (from Worksheet 2J)	0.110	0.000	0.110						
Subtotal	0.232	0.266	0.498						
Total	3.034	7.129	10.163						

Worksheet 2L Summary Results for Urban and Suburban Arterial Intersections							
(1)	(2)						
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)						
	(Total) from Worksheet 2K						
Total	10.2						
Fatal and injury (FI)	3.0						
Property damage only (PDO)	7.1						

Worksheet	1A General Information	and Input Da	ata for Urban and Suburba	n Roadway Segmer	nts	
General Information			Location Information			
Analyst	TL		Roadway		Tower Oaks Blvd	
Agency or Company	ATCS		Roadway Section		Montrose Rd to I-270 NB Ramps	
Date Performed	12/07/21		Jurisdiction		Montgomery County	
			Analysis Year		2045	
Input Data		Base Conditions		Site Conditions		
Roadway type (2U, 3T, 4U, 4D, ST)				4U		
Length of segment, L (mi)					0.17	
AADT (veh/day)	$AADT_{MAX} = 40,100$	(veh/day)			11,852	
Type of on-street parking (none/parallel/angle)	•		None		None	
Proportion of curb length with on-street parking					0	
Median width (ft) - for divided only			15		Not Present	
Lighting (present / not present)			Not Present	Present		
Auto speed enforcement (present / not present)			Not Present	Not Present		
Major commercial driveways (number)					0	
Minor commercial driveways (number)				1		
Major industrial / institutional driveways (number)					0	
Minor industrial / institutional driveways (number)					0	
Major residential driveways (number)					0	
Minor residential driveways (number)					0	
Other driveways (number)					0	
Speed Category	·			F	Posted Speed Greater than 30 mph	
Roadside fixed object density (fixed objects / mi)			0		195	
Offset to roadside fixed objects (ft) [If greater than 30 or Not Pr	esent, input 30]		30	14		
Calibration Factor, Cr			1.00		1.00	

Worksheet 1B Crash Modification Factors for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)			
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF			
CMF 1r	CMF 2r	CMF 3r	CMF 4r	CMF 5r	CMF comb			
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)			
1.00	1.47	1.00	0.92	1.00	1.35			

Worksheet 1C Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments									
(1)	()	2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
•			Parameter, k	Initial N _{brmv}	Crashes	N _{brmv}	CMFs	Factor, Cr	N _{brmv}
from Table 12-3		from Table 12-3 from Equation 12-10		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)		
	а	b	IIOIII Table 12-3	nom Equation 12 10		(')TOTAL (')	Worksheet 1B		(0) (1) (0)
Total	-11.63	1.33	1.01	0.396	1.000	0.396	1.35	1.00	0.535
Fatal and Injury (FI)	-12.08	1.25	0.99	0.119	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.125	1.35	1.00	0.169
i atai and injury (i i)	-12.00	1.25	0.99	0.119	0.317	0.123	1.55	1.00	0.109
Dramarti Damara Only (DDO)	40.50	4.20	4.00	0.057	(5) _{TOTAL} -(5) _{FI}	0.074	4.05	1.00	0.265
Property Damage Only (PDO)	-12.53	1.38	1.08	0.257	0.683	0.271	1.35	1.00	0.365

Worksh	eet 1D Multiple-Vehicle No	ondriveway Collisions by	Collision Type for Urban ar	id Suburban Roadway Se	egments
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N brmv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N brmv (PDO) (crashes/year)	Predicted N _{brmv (TOTAL)} (crashes/year)
	from Table 12-4	(9)FI from Worksheet 1C	from Table 12-4	(9)PDO from Worksheet 1C	(9)TOTAL from Worksheet 1C
Total	1.000	0.169	1.000	0.365	0.535
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.511	0.087	0.506	0.185	0.271
Head-on collision	0.077	0.013	0.004	0.001	0.014
Angle collision	0.181	0.031	0.130	0.048	0.078
Sideswipe, same direction	0.093	0.016	0.249	0.091	0.107
Sideswipe, opposite direction	0.082	0.014	0.031	0.011	0.025
Other multiple-vehicle collision	0.056	0.009	0.080	0.029	0.039

	Worksheet 1E Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments									
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
Crash Severity Level			Parameter, k	Initial N _{brsv}	Crashes	N _{brsv}	CMFs	Factor, Cr	N_{brsv}	
from T		ble 12-5	from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)	
	а	b	Hom rable 12-5	Hom Equation 12-13		(+)TOTAL (0)	Worksheet 1B			
Total	-7.99	0.81	0.91	0.115	1.000	0.115	1.35	1.00	0.155	
Fatal and Injury (FI)	-7.37	0.61	0.54	0.033	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.030	1.35	1.00	0.041	
ratarana mjary (r 1)	-1.51	0.01	0.54	0.033	0.264	0.000	1.55	1.00	0.041	
Property Damage Only (PDO)	-8.50	0.84	0.97	0.091	(5) _{TOTAL} -(5) _{FI}	0.085	1.35	1.00	0.114	
Property Damage Only (PDO)	-0.50	0.04	0.97	0.091	0.736	0.065	1.35	1.00	0.114	

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(F1)	Predicted N brsv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N brsv (PDO) (crashes/year)	Predicted N _{brsv (TOTAL)} (crashes/year)
,	from Table 12-6	(9)FI from Worksheet 1E	from Table 12-6	(9)PDO from Worksheet 1E	(9)TOTAL from Worksheet 1E
Total	1.000	0.041	1.000	0.114	0.155
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.001	0.000	0.001	0.000	0.000
Collision with fixed object	0.612	0.025	0.809	0.092	0.117
Collision with other object	0.020	0.001	0.029	0.003	0.004
Other single-vehicle collision	0.367	0.015	0.161	0.018	0.033

Work	ksheet 1G Multiple-Vehicle Drive	way-Related Collisions by	y Driveway Type for Urban	and Suburban Roadway Segments	
(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	Number of driveways,	Crashes per driveway per year, N _j	Coefficient for traffic adjustment, t	Initial N _{brdwy}	Overdispersion parameter, k
	n _j	from Table 12-7	from Table 12-7	Equation 12-16	from Table 12-7
		IIOIII Table 12-7	HOIH TAble 12-7	n _j * N _j * (AADT/15,000) ^t	IIOIII Table 12-7
Major commercial	0	0.182	1.172	0.000	
Minor commercial	1	0.058	1.172	0.044	
Major industrial/institutional	0	0.198	1.172	0.000	
Minor industrial/institutional	0	0.026	1.172	0.000	
Major residential	0	0.096	1.172	0.000	
Minor residential	0	0.018	1.172	0.000	
Other	0	0.029	1.172	0.000	
Total				0.044	0.81

Worksheet 1H Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(7)		
Crash Severity Level	Initial N _{brdwy}	Proportion of total crashes (f _{dwy})	Adjusted N _{brdwy}	Combined CMFs	Calibration factor, C,	Predicted N _{brdwy}		
	(5) _{TOTAL} from Worksheet 1G	from Table 12-7	(2) _{TOTAL} * (3)	(6) from Worksheet 1B	, ·	(4)*(5)*(6)		
Total	0.044	1.000	0.044	1.35	1.00	0.059		
Fatal and injury (FI)		0.342	0.015	1.35	1.00	0.020		
Property damage only (PDO)		0.658	0.029	1.35	1.00	0.039		

Worksheet 1I Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(8)*		
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{pedr}	Predicted N _{pedr}		
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8	(5)*(6)		
Total	0.535	0.155	0.059	0.749	0.009	0.007		
Fatal and injury (FI)						0.007		

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-19

Worksheet 1J Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(8)*		
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{biker}	Predicted N _{biker}		
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9	(5)*(6)		
Total	0.535	0.155	0.059	0.749	0.002	0.001		
Fatal and injury (FI)						0.001		

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-20

(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Na III a la constante de la co	(3) from Worksheet 1D and 1F;	(5) from Worksheet 1D and 1F; and	(6) from Worksheet 1D and 1F;
Collision type	(7) from Worksheet 1H; and	(7) from Worksheet 1H	(7) from Worksheet 1H; and
	(8) from Worksheet 1I and 1J	` '	(8) from Worksheet 1I and 1J
	MULTIPLE-VEHICLE	•	IX /
Rear-end collisions (from Worksheet 1D)	0.087	0.185	0.271
Head-on collisions (from Worksheet 1D)	0.013	0.001	0.014
Angle collisions (from Worksheet 1D)	0.031	0.048	0.078
Sideswipe, same direction (from Worksheet 1D)	0.016	0.091	0.107
Sideswipe, opposite direction (from Worksheet 1D)	0.014	0.011	0.025
Oriveway-related collisions (from Worksheet 1H)	0.020	0.039	0.059
Other multiple-vehicle collision (from Worksheet 1D)	0.009	0.029	0.039
Subtotal	0.190	0.405	0.594
	SINGLE-VEHICLE	·	
Collision with animal (from Worksheet 1F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 1F)	0.025	0.092	0.117
Collision with other object (from Worksheet 1F)	0.001	0.003	0.004
Other single-vehicle collision (from Worksheet 1F)	0.015	0.018	0.033
Collision with pedestrian (from Worksheet 1I)	0.007	0.000	0.007
Collision with bicycle (from Worksheet 1J)	0.001	0.000	0.001
Subtotal	0.049	0.114	0.163
- Fotal	0.239	0.519	0.757

Worksheet 1L Summary Results for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)					
Crash Severity Level	Predicted average crash frequency, N predicted rs (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)					
	(Total) from Worksheet 1K		(2) / (3)					
Total	0.8	0.17	4.5					
Fatal and injury (FI)	0.2	0.17	1.4					
Property damage only (PDO)	0.5	0.17	3.1					

Works	heet 2A General Information and Input	t Data for Urban and Suburban A	rterial Intersections
General Informa	tion		Location Information
Analyst	TL	Roadway	Tower Oaks Blvd
Agency or Company	ATCS	Intersection	At I-270 NB Ramps/Geico Ent.
Date Performed	12/07/21	Jurisdiction	Montgomery County
		Analysis Year	2045
Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)			4SG
AADT _{major} (veh/day)	$AADT_{MAX} = 67,700 (veh/day)$		11,961
AADT _{minor} (veh/day)	$AADT_{MAX} = 33,400$ (veh/day)		7,681
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C _i		1.00	1.00
Data for unsignalized intersections only:			
Number of major-road approaches with left-turn lane	es (0,1,2)	0	0
Number of major-road approaches with right-turn la	nes (0,1,2)	0	0
Data for signalized intersections only:			
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	1
Number of approaches with right-turn lanes (0,1,2,3	,4) [for 3SG, use maximum value of 3]	0	1
Number of approaches with left-turn signal phasing	[for 3SG, use maximum value of 3]		2
Type of left-turn signal phasing for Leg #1		Permissive	Protected
Type of left-turn signal phasing for Leg #2			Permissive
Type of left-turn signal phasing for Leg #3			Protected
Type of left-turn signal phasing for Leg #4 (if applica	ble)		Permissive
Number of approaches with right-turn-on-red prohib	ited [for 3SG, use maximum value of 3]	0	0
Intersection red light cameras (present/not present)		Not Present	Not Present
Sum of all pedestrian crossing volumes (PedVol)	Signalized intersections only		123
Maximum number of lanes crossed by a pedestrian	(n _{lanesx})		4
Number of bus stops within 300 m (1,000 ft) of the in	ntersection	0	4
Schools within 300 m (1,000 ft) of the intersection (p		Not Present	Not Present
Number of alcohol sales establishments within 300	m (1,000 ft) of the intersection	0	0

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections								
(1)	(2)	(3)	(4)	(5)	(6)	(7)			
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF			
	Phasing								
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}			
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)			
0.90	0.94	0.96	1.00	0.91	1.00	0.74			

	Worksheet 2C Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections											
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Crash Severity Level	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
				Parameter, k	Initial N _{bimv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bimv}		
	from Table 12-10		ple 12-10 from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from	(6)*(7)*(8)				
	а	b	С	Holli Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)		
Total	-10.99	1.07	0.23	0.39	3.048	1.000	3.048	0.74	1.00	2.254		
Fotal and Injury (FI)	12 14	1 10	0.22	0.33	0.912	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.947	0.74	1.00	0.700		
Fatal and Injury (FI)	-13.14 1.18 0.22 0.33	0.22	0.33	0.33	0.33	0.33	0.912	0.311	0.947	0.74	1.00	0.700
Property Damage Only	44.00	4.00	0.04	0.44	0.000	(5) _{TOTAL} -(5) _{FI}	0.404	0.74	4.00	4.554		
(PDO)	-11.02	1.02	0.24	0.44	2.023	0.689	2.101	0.74	1.00	1.554		

	Worksheet 2D Multiple-	Vehicle Collisions by Collis	sion Type for Urban and Suburb	an Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bimv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv (TOTAL)} (crashes/year)
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C
Total	1.000	0.700	1.000	1.554	2.254
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.450	0.315	0.483	0.750	1.066
Head-on collision	0.049	0.034	0.030	0.047	0.081
Angle collision	0.347	0.243	0.244	0.379	0.622
Sideswipe	0.099	0.069	0.032	0.050	0.119
Other multiple-vehicle collision	0.055	0.039	0.211	0.328	0.366

		Worksheet	2E Single-\	ehicle Collisions by Severi	ty Level for Urban	and Suburban Arterial In	tersections			
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
			Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}	
Crash Severity Level	fr	om Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)
	a b c	from Table 12-12	(FI) from Eqn. 12-		(T)TOTAL (U)	Worksheet 2B		(0) (1) (0)		
	а	D	C		24 or 12-27					
Total	-10.21	0.68	0.27	0.36	0.244	1.000	0.244	0.74	1.00	0.181
Fotal and Injury (FI)	-9.25	0.43	0.29	0.09	$(4)_{Fi}/((4)_{Fi}+(4)_{PDO})$		0.074 0.74	0.74	1.00	0.055
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.073	0.302	0.074	0.74	1.00	0.055
Property Damage Only	44.04	0.70	0.05	0.44	0.400	(5) _{TOTAL} -(5) _{FI}	0.474	0.74	4.00	0.400
(PDO)	-11.34	0.78	0.25	0.44	0.169	0.698	0.171	0.74	1.00	0.126

	Worksheet 2F Single-V	ehicle Collisions by Collis	ion Type for Urban and Suburba	an Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(F1)	Predicted N _{bisv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv (TOTAL)} (crashes/year)
	from Table 12-13	(9)FI from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.055	1.000	0.126	0.181
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.000	0.000
Collision with fixed object	0.744	0.041	0.870	0.110	0.150
Collision with other object	0.072	0.004	0.070	0.009	0.013
Other single-vehicle collision	0.040	0.002	0.023	0.003	0.005
Single-vehicle noncollision	0.141	0.008	0.034	0.004	0.012

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections								
(1) (2) (3) (4) (5) $(7)^*$								
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}			
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)			
Total								
Fatal and injury (FI)				-				

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections								
(1)	(1) (2) (3) (4)								
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF						
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CMF						
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)						
4.15	1.00	1.00	4.15						

Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections										
(1)		(2)					(4)	(5)	(6)	(7)
Crash Severity Level	SPF Coefficients					Overdispersion	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}
Crash Severity Level		from Table 12-14					from Equation 12-29	n 12-29 (4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)
	а	b	С	d	е		IIOIII Equation 12-29	(4) HOIH WORKSHEEL ZIT		(4) (3) (0)
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.035	4.15	1.00	0.143
Fatal and Injury (FI)									1.00	0.143

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections									
(1)	(2) (3) (4) (5) (7)*								
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}				
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)				
Total	2.254	0.181	2.435	0.015	0.037				
Fatal and injury (FI)		-			0.037				

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksh	eet 2K Crash Severity Distribution for Urban a	nd Suburban Arterial Intersections	
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE	·	
Rear-end collisions (from Worksheet 2D)	0.315	0.750	1.066
Head-on collisions (from Worksheet 2D)	0.034	0.047	0.081
Angle collisions (from Worksheet 2D)	0.243	0.379	0.622
Sideswipe (from Worksheet 2D)	0.069	0.050	0.119
Other multiple-vehicle collision (from Worksheet 2D)	0.039	0.328	0.366
Subtotal	0.700	1.554	2.254
	SINGLE-VEHICLE		•
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 2F)	0.041	0.110	0.150
Collision with other object (from Worksheet 2F)	0.004	0.009	0.013
Other single-vehicle collision (from Worksheet 2F)	0.002	0.003	0.005
Single-vehicle noncollision (from Worksheet 2F)	0.008	0.004	0.012
Collision with pedestrian (from Worksheet 2G or 2I)	0.143	0.000	0.143
Collision with bicycle (from Worksheet 2J)	0.037	0.000	0.037
Subtotal	0.234	0.126	0.361
Total	0.935	1.680	2.615

Worksheet 2L Summary Resu	Worksheet 2L Summary Results for Urban and Suburban Arterial Intersections						
(1)	(2)						
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)						
	(Total) from Worksheet 2K						
Total	2.6						
Fatal and injury (FI)	0.9						
Property damage only (PDO)	1.7						

2	Worksheet 2A General Information and Input	Data for Orban and Suburban Arteria	
	ral Information		Location Information
Analyst	TL	Roadway	MD 28 Key W Ave
Agency or Company	ATCS	Intersection	At Omega Dr/Medical Center Dr
Date Performed	12/07/21	Jurisdiction	Montgomery County
	17.1	Analysis Year	2045
	nput Data	Base Conditions	Site Conditions 4SG
Intersection type (3ST, 3SG, 4ST, 4SG)	$AADT_{MAX} = 67.700 (veh/day)$		
AADT major (veh/day)			28,732
AADT _{minor} (veh/day)	$AADT_{MAX} = 33,400 (veh/day)$		11,281
Intersection lighting (present/not present)	-	Not Present	Present
Calibration factor, C _i		1.00	1.00
Data for unsignalized intersections only:			
Number of major-road approaches with	eft-turn lanes (0,1,2)	0	0
Number of major-road approaches with	ight-turn lanes (0,1,2)	0	0
Data for signalized intersections only:			
Number of approaches with left-turn lane	es (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	4
Number of approaches with right-turn la	nes (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	4
Number of approaches with left-turn sign	nal phasing [for 3SG, use maximum value of 3]		4
Type of left-turn signal phasing for Leg #	1	Permissive	Protected
Type of left-turn signal phasing for Leg #	2		Protected
Type of left-turn signal phasing for Leg #	3		Protected
Type of left-turn signal phasing for Leg #	4 (if applicable)		Protected
11	-red prohibited [for 3SG, use maximum value of 3]	0	0
Intersection red light cameras (present/r		Not Present	Not Present
	(PedVol) Signalized intersections only		260
Maximum number of lanes crossed by a	1 (lanesk)		9
Number of bus stops within 300 m (1,00	,	0	10
Schools within 300 m (1,000 ft) of the int	\ \	Not Present	Not Present
Number of alcohol sales establishments	within 300 m (1,000 ft) of the intersection	0	0

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections							
(1)	(2)	(3)	(4)	(5)	(6)	(7)		
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF		
	Phasing							
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}		
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)		
0.66	0.78	0.85	1.00	0.91	1.00	0.40		

	Worksheet 2C Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections										
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
Crash Severity Level	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
-				Parameter, k	Initial N _{bimv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N _{bimv}	
	fr	om Table 12-1	0	from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)	
	а	b	С	Holli Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)	
Total	-10.99	1.07	0.23	0.39	8.503	1.000	8.503	0.40	1.00	3.389	
Fotal and Injury (FI)	-13.14	1.18	0.22	0.33	0.704	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	2.890	0.40	1.00	1.152	
Fatal and Injury (FI)	-13.14	1.10	0.22	0.33	2.791	0.340	2.090	0.40	1.00	1.152	
Property Damage Only	44.00	4.00	0.04	0.44	F 400	(5) _{TOTAL} -(5) _{FI}	5.044	0.40	4.00	0.000	
(PDO)	-11.02	1.02	0.24	0.44	5.422	0.660	5.614	0.40	1.00	2.238	

	Worksheet 2D Multiple-	Vehicle Collisions by Collis	sion Type for Urban and Suburb	an Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bimv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv} (TOTAL) (crashes/year)
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C
Total	1.000	1.152	1.000	2.238	3.389
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.450	0.518	0.483	1.081	1.599
Head-on collision	0.049	0.056	0.030	0.067	0.124
Angle collision	0.347	0.400	0.244	0.546	0.946
Sideswipe	0.099	0.114	0.032	0.072	0.186
Other multiple-vehicle collision	0.055	0.063	0.211	0.472	0.535

		Worksheet	2E Single-V	ehicle Collisions by Severi	ty Level for Urban	and Suburban Arterial In	tersections			
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
			Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}	
Crash Severity Level	fr	om Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from	Ī	(6)*(7)*(8)
		b	С	from Table 12-12	(FI) from Eqn. 12-		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)
	а	b	C		24 or 12-27					
Total	-10.21	0.68	0.27	0.36	0.492	1.000	0.492	0.40	1.00	0.196
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.119	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.120	0.40	1.00	0.048
Fatai and injury (Fi)	-9.25	0.43	0.29	0.09	0.119	0.244	0.120	0.40	1.00	0.040
Property Damage Only	44.24	0.70	0.25	0.44	(5) _{TOTAL} -(5) _{FI}		0.070	0.40	4.00	0.440
(PDO)	-11.34	0.78	0.25	0.44	0.368	0.756	0.372	0.40	1.00	0.148

	Worksheet 2F Single-V	ehicle Collisions by Collis	ion Type for Urban and Suburba	n Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bisv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv (TOTAL)} (crashes/year)
	from Table 12-13	(9)FI from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.048	1.000	0.148	0.196
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.000	0.000
Collision with fixed object	0.744	0.036	0.870	0.129	0.164
Collision with other object	0.072	0.003	0.070	0.010	0.014
Other single-vehicle collision	0.040	0.002	0.023	0.003	0.005
Single-vehicle noncollision	0.141	0.007	0.034	0.005	0.012

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(1) (2) (3) (4) (5)								
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}				
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total									
Fatal and injury (FI)				-					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections								
(1)	(2)	(3)	(4)						
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF						
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CMF						
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)						
4.15	1.00	1.00	4.15						

Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections										
(1)		(2)					(4)	(5)	(6)	(7)
Crash Severity Level	SPF Coefficients					Overdispersion	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}
Crash Severity Level		from Table 12-14					from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)
	а	b	С	d	е		Irom Equation 12-29	(4) Holli Worksheet 2H		(4) (3) (0)
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.069	4.15	1.00	0.287
Fatal and Injury (FI)									1.00	0.287

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections									
(1)	(2)	(2) (3) (4) (5)							
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}				
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)				
Total	3.389	0.196	3.585	0.015	0.054				
Fatal and injury (FI)		-			0.054				

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksh	eet 2K Crash Severity Distribution for Urban a	nd Suburban Arterial Intersections	
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE		• • •
Rear-end collisions (from Worksheet 2D)	0.518	1.081	1.599
Head-on collisions (from Worksheet 2D)	0.056	0.067	0.124
Angle collisions (from Worksheet 2D)	0.400	0.546	0.946
Sideswipe (from Worksheet 2D)	0.114	0.072	0.186
Other multiple-vehicle collision (from Worksheet 2D)	0.063	0.472	0.535
Subtotal	1.152	2.238	3.389
	SINGLE-VEHICLE		
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 2F)	0.036	0.129	0.164
Collision with other object (from Worksheet 2F)	0.003	0.010	0.014
Other single-vehicle collision (from Worksheet 2F)	0.002	0.003	0.005
Single-vehicle noncollision (from Worksheet 2F)	0.007	0.005	0.012
Collision with pedestrian (from Worksheet 2G or 2I)	0.287	0.000	0.287
Collision with bicycle (from Worksheet 2J)	0.054	0.000	0.054
Subtotal	0.388	0.148	0.537
Total	1.540	2.386	3.926

Worksheet 2L Summary Results for Urban and Suburban Arterial Intersections							
(1)	(2)						
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)						
	(Total) from Worksheet 2K						
Total	3.9						
Fatal and injury (FI)	1.5						
Property damage only (PDO)	2.4						

Worksheet	1A General Ir	nformation	and Input Da	ata for Urban and Suburbar	n Roadway	Segments	
General Information						Location Information	
Analyst		TL		Roadway		Omega Dr	
Agency or Company		ATCS		Roadway Section		MD 28 to Research Blvd	
Date Performed	12/07/21			Jurisdiction		Montgomery County	
				Analysis Year		2045	
Input Data				Base Conditions		Site Conditions	
Roadway type (2U, 3T, 4U, 4D, ST)						4D	
Length of segment, L (mi)						0.04	
AADT (veh/day)	$AADT_{MAX} =$	66,000	(veh/day)			11,731	
Type of on-street parking (none/parallel/angle)				None	None		
Proportion of curb length with on-street parking						0	
Median width (ft) - for divided only				15		10	
Lighting (present / not present)				Not Present		Present	
Auto speed enforcement (present / not present)				Not Present		Not Present	
Major commercial driveways (number)						0	
Minor commercial driveways (number)						0	
Major industrial / institutional driveways (number)						0	
Minor industrial / institutional driveways (number)						0	
Major residential driveways (number)						0	
Minor residential driveways (number)						0	
Other driveways (number)						0	
Speed Category		•				Posted Speed Greater than 30 mph	
Roadside fixed object density (fixed objects / mi)				0		0	
Offset to roadside fixed objects (ft) [If greater than 30 or Not Pro	esent, input 30]			30		30	
Calibration Factor, Cr				1.00		1.00	

	Worksheet 1B Crash Modification Factors for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)				
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF				
CMF 1r	CMF 2r	CMF 3r	CMF 4r	CMF 5r	CMF comb				
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)				
1.00	1.00	1.01	0.91	1.00	0.92				

(4)			e-Vehicle Nondriveway Co	ollisions by Severity Level	tor Urban and Suburba		egments	(0)	(0)
(1) Crash Severity Level	,	2) efficients	(3) Overdispersion Parameter, k	(4) Initial N _{brmv}	(5) Proportion of Total Crashes	(6) Adjusted N _{brmv}	Combined CMFs	(8) Calibration Factor, Cr	(9) Predicted N _{brmv}
	from Ta a	ble 12-3 b	from Table 12-3	from Equation 12-10		(4) _{TOTAL} *(5)	(6) from Worksheet 1B		(6)*(7)*(8)
Total	-12.34	1.36	1.32	0.060	1.000	0.060	0.92	1.00	0.055
Fatal and Injury (FI)	-12.76	1.28	1.31	0.019	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.292	0.017	0.92	1.00	0.016
Property Damage Only (PDO)	-12.81	1.38	1.34	0.045	(5) _{TOTAL} -(5) _{FI} 0.708	0.042	0.92	1.00	0.039

Wor	ksheet 1D Multiple-Vehicle No	ndriveway Collisions by	Collision Type for Urban ar	id Suburban Roadway Se	egments
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N brmv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N brmv (PDO) (crashes/year)	Predicted N _{brmv (TOTAL)} (crashes/year)
	from Table 12-4	(9)FI from Worksheet 1C	from Table 12-4	(9)PDO from Worksheet 1C	(9)TOTAL from Worksheet 1C
Total	1.000	0.016	1.000	0.039	0.055
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.832	0.013	0.662	0.026	0.039
Head-on collision	0.020	0.000	0.007	0.000	0.001
Angle collision	0.040	0.001	0.036	0.001	0.002
Sideswipe, same direction	0.050	0.001	0.223	0.009	0.010
Sideswipe, opposite direction	0.010	0.000	0.001	0.000	0.000
Other multiple-vehicle collision	0.048	0.001	0.071	0.003	0.004

	Worksheet 1E Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments									
(1)	(2	2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
Crash Severity Level			Parameter, k	Initial N _{brsv}	Crashes	N _{brsv}	CMFs	Factor, Cr	N _{brsv}	
Clash Seventy Level	from Ta	ble 12-5	from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)	
	а	b	Hom rable 12-5	Holli Equation 12-13		(T)TOTAL (U)	Worksheet 1B		(0) (1) (0)	
Total	-5.05	0.47	0.86	0.021	1.000	0.021	0.92	1.00	0.019	
Fatal and Injury (FI)	-8.71	0.66	0.28	0.003	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.003	0.92	1.00	0.003	
i atai and injury (i i)	-0.71	0.00	0.20	0.003	0.154	0.003	0.92	1.00	0.003	
Property Demogra Only (PDO)	-5.04	0.45	1.06	0.018	(5) _{TOTAL} -(5) _{FI}	0.018	0.92	1.00	0.016	
Property Damage Only (PDO)	-5.04	0.45	1.00	0.018	0.846	0.018	0.92	1.00	0.016	

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(F1)	Predicted N brsv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N brsv (PDO) (crashes/year)	Predicted N _{brsv (TOTAL)} (crashes/year)
,	from Table 12-6	(9)FI from Worksheet 1E	from Table 12-6	(9)PDO from Worksheet 1E	(9)TOTAL from Worksheet 1E
Total	1.000	0.003	1.000	0.016	0.019
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.001	0.000	0.063	0.001	0.001
Collision with fixed object	0.500	0.001	0.813	0.013	0.015
Collision with other object	0.028	0.000	0.016	0.000	0.000
Other single-vehicle collision	0.471	0.001	0.108	0.002	0.003

Work	sheet 1G Multiple-Vehicle Drive	way-Related Collisions by	y Driveway Type for Urban	and Suburban Roadway Segments		
(1)	(2)	(3)	(4)	(5)	(6)	
Deixeyeav Type	Number of driveways,	Crashes per driveway per year, N _j	Coefficient for traffic adjustment, t	Initial N _{brdwy}	Overdispersion parameter, k	
Driveway Type	n _i	from Table 12-7	from Table 12-7	Equation 12-16	from Table 12-7	
	•	ITOTTI TADIE 12-7	ITOTTI TABLE 12-7	n _j * N _j * (AADT/15,000) ^t	iioiii rable 12-7	
Major commercial	0	0.033	1.106	0.000		
Minor commercial	0	0.011	1.106	0.000		
Major industrial/institutional	0	0.036	1.106	0.000		
Minor industrial/institutional	0	0.005	1.106	0.000		
Major residential	0	0.018	1.106	0.000		
Minor residential	0	0.003	1.106	0.000		
Other	0	0.005	1.106	0.000		
Total				0.000	1.39	

Worksheet 1H Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(7)		
Crash Severity Level	Initial N _{brdwy}	Proportion of total crashes (f _{dwy})	Adjusted N _{brdwy}	Combined CMFs	Calibration factor, C,	Predicted N _{brdwy}		
	(5) _{TOTAL} from Worksheet 1G	from Table 12-7	(2) _{TOTAL} * (3)	(6) from Worksheet 1B	, ,	(4)*(5)*(6)		
Total	0.000	1.000	0.000	0.92	1.00	0.000		
Fatal and injury (FI)		0.284	0.000	0.92	1.00	0.000		
Property damage only (PDO)		0.716	0.000	0.92	1.00	0.000		

	Worksheet 1I Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(8)*			
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{pedr}	Predicted N _{pedr}			
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8	(5)*(6)			
Total	0.055	0.019	0.000	0.075	0.019	0.001			
Fatal and injury (FI)						0.001			

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-19

	Worksheet 1J Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(8)*		
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{biker}	Predicted N _{biker}		
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9	(5)*(6)		
Total	0.055	0.019	0.000	0.075	0.005	0.000		
Fatal and injury (FI)						0.000		

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-20

(1)	(2)	(3)	(4)
(' /	Fatal and injury (FI)	Property damage only (PDO)	Total
N 10: 1 /	(3) from Worksheet 1D and 1F;	(5) from Worksheet 1D and 1F; and	(6) from Worksheet 1D and 1F;
Collision type	(7) from Worksheet 1H; and	(7) from Worksheet 1H	(7) from Worksheet 1H; and
	(8) from Worksheet 1I and 1J		(8) from Worksheet 1I and 1J
	MULTIPLE-VEHICLE	•	
Rear-end collisions (from Worksheet 1D)	0.013	0.026	0.039
lead-on collisions (from Worksheet 1D)	0.000	0.000	0.001
ingle collisions (from Worksheet 1D)	0.001	0.001	0.002
Sideswipe, same direction (from Worksheet 1D)	0.001	0.009	0.010
Sideswipe, opposite direction (from Worksheet 1D)	0.000	0.000	0.000
Oriveway-related collisions (from Worksheet 1H)	0.000	0.000	0.000
Other multiple-vehicle collision (from Worksheet 1D)	0.001	0.003	0.004
Subtotal	0.016	0.039	0.055
	SINGLE-VEHICLE		
Collision with animal (from Worksheet 1F)	0.000	0.001	0.001
Collision with fixed object (from Worksheet 1F)	0.001	0.013	0.015
Collision with other object (from Worksheet 1F)	0.000	0.000	0.000
Other single-vehicle collision (from Worksheet 1F)	0.001	0.002	0.003
Collision with pedestrian (from Worksheet 1I)	0.001	0.000	0.001
Collision with bicycle (from Worksheet 1J)	0.000	0.000	0.000
Subtotal	0.005	0.016	0.021
otal	0.021	0.056	0.076

Worksheet 1L Summary Results for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)					
Crash Severity Level	Predicted average crash frequency, N predicted rs (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)					
	(Total) from Worksheet 1K		(2) / (3)					
Total	0.1	0.04	1.9					
Fatal and injury (FI)	0.0	0.04	0.5					
Property damage only (PDO)	0.1	0.04	1.4					

	Worksheet 2A General Information and Input	Data for Orban and Suburban Artena	
	nformation		Location Information
Analyst	TL	Roadway	Omega Dr
Agency or Company	ATCS	Intersection	At Research Blvd/Driveway
Date Performed	12/07/21	Jurisdiction	Montgomery County
		Analysis Year	2045
· ·	t Data	Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)			3ST
AADT _{major} (veh/day)	$AADT_{MAX} = 45,700 (veh/day)$	-	11,686
AADT _{minor} (veh/day)	$AADT_{MAX} = 9,300 (veh/day)$	-	4,202
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C _i		1.00	1.00
Data for unsignalized intersections only:			
Number of major-road approaches with left-t	urn lanes (0,1,2)	0	1
Number of major-road approaches with right	-turn lanes (0,1,2)	0	0
Data for signalized intersections only:			
Number of approaches with left-turn lanes (0	,1,2,3,4) [for 3SG, use maximum value of 3]	0	
Number of approaches with right-turn lanes ((0,1,2,3,4) [for 3SG, use maximum value of 3]	0	
Number of approaches with left-turn signal p	hasing [for 3SG, use maximum value of 3]		
Type of left-turn signal phasing for Leg #1		Permissive	
Type of left-turn signal phasing for Leg #2			
Type of left-turn signal phasing for Leg #3			
Type of left-turn signal phasing for Leg #4 (if	applicable)		
Number of approaches with right-turn-on-red	prohibited [for 3SG, use maximum value of 3]	0	
Intersection red light cameras (present/not p		Not Present	
Sum of all pedestrian crossing volumes (Pe	dVol) Signalized intersections only		
Maximum number of lanes crossed by a ped	estrian (n _{lanesx})		
Number of bus stops within 300 m (1,000 ft)	of the intersection	0	
Schools within 300 m (1,000 ft) of the interse	\(\)	Not Present	
Number of alcohol sales establishments with	in 300 m (1,000 ft) of the intersection	0	

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections								
(1)	(2)	(3)	(4)	(5)	(6)	(7)			
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF			
	Phasing								
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}			
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)			
0.67	1.00	1.00	1.00	0.91	1.00	0.61			

	Worksheet 2C Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections											
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Crash Severity Level	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
-				Parameter, k	Initial N _{bimv}	Crashes	N _{bimv}	CMFs	Factor, C _i	N_{bimv}		
	fr	om Table 12-1	0	from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)		
	а	b	С	IIOIII Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)		
Total	-13.36	1.11	0.41	0.80	1.580	1.000	1.580	0.61	1.00	0.965		
Fotal and Injuny (FI)	-14.01	1.16	0.30	0.69	0.500	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.504	0.61	1.00	0.308		
Fatal and Injury (FI)	-14.01	1.10	0.30	0.69	0.526	0.319	0.504	0.61	1.00	0.306		
Property Damage Only	45.00	4.00	0.54	0.77	4.404	(5) _{TOTAL} -(5) _{FI}	4.075	0.04	4.00	0.057		
(PDO)	-15.38	1.20	0.51	0.77	1.121	0.681	1.075	0.61	1.00	0.657		

	Worksheet 2D Multiple-	Vehicle Collisions by Collis	sion Type for Urban and Suburb	an Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bimv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv} (TOTAL) (crashes/year)
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C
Total	1.000	0.308	1.000	0.657	0.965
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.421	0.130	0.440	0.289	0.419
Head-on collision	0.045	0.014	0.023	0.015	0.029
Angle collision	0.343	0.106	0.262	0.172	0.278
Sideswipe	0.126	0.039	0.040	0.026	0.065
Other multiple-vehicle collision	0.065	0.020	0.235	0.154	0.174

		Worksheet	2E Single-V	ehicle Collisions by Severi	ty Level for Urban	and Suburban Arterial In	tersections			•
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
			Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}	
Crash Severity Level	fr	om Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from	Ī	(6)*(7)*(8)
		b	С	from Table 12-12	(FI) from Eqn. 12-		(+)TOTAL (3)	Worksheet 2B		(0) (1) (0)
	а	D	C		24 or 12-27					
Total	-6.81	0.16	0.51	1.14	0.348	1.000	0.348	0.61	1.00	0.212
Fatal and Injury (FI)					0.108	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.108	0.61	1.00	0.066
Fatai and injury (Fi)					0.100	0.310	0.100	0.01	1.00	0.000
Property Damage Only	0.00	0.25	0.55	1.20	0.000	(5) _{TOTAL} -(5) _{FI}	0.040	0.04	1.00	0.447
(PDO)	-8.36	0.25	0.55	1.29	0.239	0.690	0.240	0.61		0.147

	Worksheet 2F Single-V	ehicle Collisions by Collis	ion Type for Urban and Suburba	n Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bisv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv} (TOTAL) (crashes/year)
	from Table 12-13	(9)FI from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.066	1.000	0.147	0.212
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.003	0.000	0.001
Collision with animal	0.003	0.000	0.018	0.003	0.003
Collision with fixed object	0.762	0.050	0.834	0.122	0.172
Collision with other object	0.090	0.006	0.092	0.013	0.019
Other single-vehicle collision	0.039	0.003	0.023	0.003	0.006
Single-vehicle noncollision	0.105	0.007	0.030	0.004	0.011

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(1) (2) (3) (4) (5)								
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}				
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total	0.965	0.212	1.178	0.021	0.025				
Fatal and injury (FI)				-	0.025				

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections								
(1)	(2)	(3)	(4)						
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF						
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CiviF						
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)						
									

Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections											
(1)	(2)					(3)	(4)	(5)	(6)	(7)	
Crash Severity Level	SPF Coefficients					Overdispersion	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}	
Crash Severity Level		f	rom Table 12-1	4		Parameter, k	from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)	
	а	b	С	d	е	- IIOIII Equation 12-2		(4) Holli Worksheet 211		(4) (3) (0)	
Total									1.00		
Fatal and Injury (FI)									1.00		

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections									
(1)	(2)	(2) (3) (4) (5)							
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}				
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)				
Total	0.965	0.212	1.178	0.016	0.019				
Fatal and injury (FI)				-	0.019				

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksh	neet 2K Crash Severity Distribution for Urban a	nd Suburban Arterial Intersections	
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE	·	
Rear-end collisions (from Worksheet 2D)	0.130	0.289	0.419
Head-on collisions (from Worksheet 2D)	0.014	0.015	0.029
Angle collisions (from Worksheet 2D)	0.106	0.172	0.278
Sideswipe (from Worksheet 2D)	0.039	0.026	0.065
Other multiple-vehicle collision (from Worksheet 2D)	0.020	0.154	0.174
Subtotal	0.308	0.657	0.965
	SINGLE-VEHICLE		•
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.001
Collision with animal (from Worksheet 2F)	0.000	0.003	0.003
Collision with fixed object (from Worksheet 2F)	0.050	0.122	0.172
Collision with other object (from Worksheet 2F)	0.006	0.013	0.019
Other single-vehicle collision (from Worksheet 2F)	0.003	0.003	0.006
Single-vehicle noncollision (from Worksheet 2F)	0.007	0.004	0.011
Collision with pedestrian (from Worksheet 2G or 2I)	0.025	0.000	0.025
Collision with bicycle (from Worksheet 2J)	0.019	0.000	0.019
Subtotal	0.110	0.147	0.256
Total	0.418	0.803	1.221

Worksheet 2L Summary Res	Worksheet 2L Summary Results for Urban and Suburban Arterial Intersections							
(1)	(2)							
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)							
	(Total) from Worksheet 2K							
Total	1.2							
Fatal and injury (FI)	0.4							
Property damage only (PDO)	0.8							

Worksheet	1A General In	formation	and Input D	ata for Urban and Suburba	n Roadway	Segments	
General Information			-	Location Information			
Analyst		TL		Roadway		Omega Dr	
Agency or Company		ATCS		Roadway Section		Research Blvd to I-270 SB Off-Ramp	
Date Performed	•	12/07/21		Jurisdiction Mont		Montgomery County	
				Analysis Year		2045	
Input Data				Base Conditions		Site Conditions	
Roadway type (2U, 3T, 4U, 4D, ST)						4D	
Length of segment, L (mi)						0.24	
AADT (veh/day)	AADT _{MAX} =	66,000	(veh/day)			11,706	
Type of on-street parking (none/parallel/angle)				None	None		
Proportion of curb length with on-street parking						0	
Median width (ft) - for divided only				15		15	
Lighting (present / not present)				Not Present		Present	
Auto speed enforcement (present / not present)				Not Present		Not Present	
Major commercial driveways (number)						0	
Minor commercial driveways (number)						0	
Major industrial / institutional driveways (number)						0	
Minor industrial / institutional driveways (number)						0	
Major residential driveways (number)						1	
Minor residential driveways (number)						0	
Other driveways (number)						1	
Speed Category			•			Posted Speed Greater than 30 mph	
Roadside fixed object density (fixed objects / mi)				0		0	
Offset to roadside fixed objects (ft) [If greater than 30 or Not Pr	esent, input 30]	•	•	30		30	
Calibration Factor, Cr		•		1.00		1.00	

	Worksheet 1B Crash Modification Factors for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)					
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF					
CMF 1r	CMF 2r	CMF 3r	CMF 4r	CMF 5r	CMF comb					
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)					
1.00	1.00	1.00	0.91	1.00	0.91					

(4)			e-Vehicle Nondriveway Co	onisions by Severity Level	for Orban and Suburba		egments	(0)	(0)
(1)	,	2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
			Parameter, k	Initial N _{brmv}	Crashes	N _{brmv}	CMFs	Factor, Cr	N _{brmv}
	from Ta	ble 12-3	from Table 12-3 from Equation 12-			(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)
	а	b	IIOIII Table 12-3			()TOTAL ()	Worksheet 1B		
Total	-12.34	1.36	1.32	0.358	1.000	0.358	0.91	1.00	0.327
Fatal and Injury (FI)	-12.76	1.28	1.31	0.111	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.292	0.104	0.91	1.00	0.095
Property Damage Only (PDO)	-12.81	1.38	1.34	0.270	(5) _{TOTAL} -(5) _{FI} 0.708	0.254	0.91	1.00	0.232

Worksh	eet 1D Multiple-Vehicle No	ndriveway Collisions by	Collision Type for Urban ar	id Suburban Roadway Se	egments
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N brmv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N brmv (PDO) (crashes/year)	Predicted N _{brmv (TOTAL)} (crashes/year)
	from Table 12-4	(9) _{FI} from Worksheet 1C	from Table 12-4	(9)PDO from Worksheet 1C	(9)TOTAL from Worksheet 1C
Total	1.000	0.095	1.000	0.232	0.327
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.832	0.079	0.662	0.153	0.233
Head-on collision	0.020	0.002	0.007	0.002	0.004
Angle collision	0.040	0.004	0.036	0.008	0.012
Sideswipe, same direction	0.050	0.005	0.223	0.052	0.056
Sideswipe, opposite direction	0.010	0.001	0.001	0.000	0.001
Other multiple-vehicle collision	0.048	0.005	0.071	0.016	0.021

	Worksheet 1E Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments									
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
Crash Severity Level			Parameter, k	Initial N _{brsv}	Crashes	N _{brsv}	CMFs	Factor, Cr	N_{brsv}	
Orasii Geventy Level	from Ta	ble 12-5	from Table 12-5	Table 12-5 from Equation 12-13		$(4)_{TOTAL}^*(5)$ (6) from			(6)*(7)*(8)	
	а	b	Hom Table 12-3			(')TOTAL (")	Worksheet 1B		(0) (1) (0)	
Total	-5.05	0.47	0.86	0.126	1.000	0.126	0.91	1.00	0.115	
Fatal and Injury (FI)	-8.71	0.66	0.28	0.019	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.019	0.91	1.00	0.018	
ratarana injury (i i)	-0.71	0.00	0.20	0.019	0.154	0.013	0.51	1.00	0.010	
Property Demoge Only (PDO)	-5.04	0.45	1.06	0.105	(5) _{TOTAL} -(5) _{FI}	0.106	0.91	1.00	0.097	
Property Damage Only (PDO)	-5.04	0.45	1.06	0.105	0.846	0.100	0.91	1.00	0.097	

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{brsv} (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N brsv (PDO) (crashes/year)	Predicted N $_{brsv}$ (TOTAL) (crashes/year)
	from Table 12-6	(9) _{FI} from Worksheet 1E	from Table 12-6	(9) _{PDO} from Worksheet 1E	(9)TOTAL from Worksheet 1E
Total	1.000	0.018	1.000	0.097	0.115
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.001	0.000	0.063	0.006	0.006
Collision with fixed object	0.500	0.009	0.813	0.079	0.088
Collision with other object	0.028	0.000	0.016	0.002	0.002
Other single-vehicle collision	0.471	0.008	0.108	0.010	0.019

Work	sheet 1G Multiple-Vehicle Drive	way-Related Collisions by	y Driveway Type for Urban	and Suburban Roadway Segments	
(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	Number of driveways,	Crashes per driveway per year, N _j	Coefficient for traffic adjustment, t	Initial N _{brdwy}	Overdispersion parameter, k
	n _i	from Table 12-7	from Table 12-7	Equation 12-16	from Table 12-7
	-	ITOTTI TABLE 12-7	Holli Table 12-7	n _i * N _i * (AADT/15,000) ^t	IIOIII Table 12-7
Major commercial	0	0.033	1.106	0.000	
Minor commercial	0	0.011	1.106	0.000	
Major industrial/institutional	0	0.036	1.106	0.000	
Minor industrial/institutional	0	0.005	1.106	0.000	
Major residential	1	0.018	1.106	0.014	
Minor residential	0	0.003	1.106	0.000	
Other	1	0.005	1.106	0.004	
Total				0.017	1.39

Worksheet 1H Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	
Crash Severity Level	Initial N _{brdwy}	Proportion of total crashes (f _{dwy})	Adjusted N _{brdwy}	Combined CMFs	Calibration factor, C,	Predicted N _{brdwy}	
	(5) _{TOTAL} from Worksheet 1G	from Table 12-7	(2) _{TOTAL} * (3) (6) from Worksheet		, ,	(4)*(5)*(6)	
Total	0.017	1.000	0.017	0.91	1.00	0.016	
Fatal and injury (FI)		0.284	0.005	0.91	1.00	0.005	
Property damage only (PDO)		0.716	0.013	0.91	1.00	0.011	

Worksheet 1I Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(8)*	
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{pedr}	Predicted N _{pedr}	
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8	(5)*(6)	
Total	0.327	0.115	0.016	0.458	0.019	0.009	
Fatal and injury (FI)						0.009	

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-19

	Worksheet 1J Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(8)*		
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{biker}	Predicted N _{biker}		
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9	(5)*(6)		
Total	0.327	0.115	0.016	0.458	0.005	0.002		
Fatal and injury (FI)						0.002		

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-20

(1)	(2)	(3)	(4)
(*/	Fatal and injury (FI)	Property damage only (PDO)	Total
N=11!=!=== 4	(3) from Worksheet 1D and 1F;	(5) from Worksheet 1D and 1F; and	(6) from Worksheet 1D and 1F;
Collision type	(7) from Worksheet 1H; and	(7) from Worksheet 1H	(7) from Worksheet 1H; and
	(8) from Worksheet 1I and 1J	, ,	(8) from Worksheet 1I and 1J
	MULTIPLE-VEHICLE	•	
Rear-end collisions (from Worksheet 1D)	0.079	0.153	0.233
lead-on collisions (from Worksheet 1D)	0.002	0.002	0.004
ingle collisions (from Worksheet 1D)	0.004	0.008	0.012
Sideswipe, same direction (from Worksheet 1D)	0.005	0.052	0.056
Sideswipe, opposite direction (from Worksheet 1D)	0.001	0.000	0.001
Priveway-related collisions (from Worksheet 1H)	0.005	0.011	0.016
Other multiple-vehicle collision (from Worksheet 1D)	0.005	0.016	0.021
Subtotal	0.100	0.243	0.343
	SINGLE-VEHICLE	·	
Collision with animal (from Worksheet 1F)	0.000	0.006	0.006
Collision with fixed object (from Worksheet 1F)	0.009	0.079	0.088
Collision with other object (from Worksheet 1F)	0.000	0.002	0.002
Other single-vehicle collision (from Worksheet 1F)	0.008	0.010	0.019
Collision with pedestrian (from Worksheet 1I)	0.009	0.000	0.009
Collision with bicycle (from Worksheet 1J)	0.002	0.000	0.002
Subtotal	0.029	0.097	0.126
otal	0.129	0.340	0.469

Worksheet 1L Summary Results for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)				
Crash Severity Level	Predicted average crash frequency, N predicted rs (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)				
	(Total) from Worksheet 1K		(2) / (3)				
Total	0.5	0.24	2.0				
Fatal and injury (FI)	0.1	0.24	0.5				
Property damage only (PDO)	0.3	0.24	1.4				

Works	heet 2A General Information and Inpu	t Data for Urban and Suburban A	rterial Intersec	ctions	
General Informa	tion		Locati	on Information	
Analyst	TL	Roadway		Omega Dr/Fields Rd	
Agency or Company	ATCS	Intersection		At I-270 SB Off-Ramp	
Date Performed	12/07/21	Jurisdiction		Montgomery County	
		Analysis Year		2045	
Input Data		Base Conditions		Site Conditions	
Intersection type (3ST, 3SG, 4ST, 4SG)				3ST	
AADT _{major} (veh/day)	$AADT_{MAX} = 45,700 (veh/day)$			11,761	
AADT minor (veh/day)	$AADT_{MAX} = 9,300$ (veh/day)			2,896	
Intersection lighting (present/not present)		Not Present		Present	
Calibration factor, C _i		1.00		1.00	
Data for unsignalized intersections only:					
Number of major-road approaches with left-turn land	0		0		
Number of major-road approaches with right-turn la	nes (0,1,2)	0		0	
Data for signalized intersections only:					
		0			
Number of approaches with right-turn lanes (0,1,2,3	,4) [for 3SG, use maximum value of 3]	0			
Number of approaches with left-turn signal phasing	[for 3SG, use maximum value of 3]				
Type of left-turn signal phasing for Leg #1		Permissive			
Type of left-turn signal phasing for Leg #2					
Type of left-turn signal phasing for Leg #3					
Type of left-turn signal phasing for Leg #4 (if applica					
Number of approaches with right-turn-on-red prohib	ited [for 3SG, use maximum value of 3]	0			
Intersection red light cameras (present/not present)	Not Present				
Sum of all pedestrian crossing volumes (PedVol)					
Maximum number of lanes crossed by a pedestrian	(n _{lanesx})				
Number of bus stops within 300 m (1,000 ft) of the i		0			
Schools within 300 m (1,000 ft) of the intersection (p		Not Present			
Number of alcohol sales establishments within 300	m (1,000 ft) of the intersection	0			

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections								
(1)	(2)	(3)	(4)	(5)	(6)	(7)			
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF			
	Phasing								
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}			
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)			
1.00	1.00	1.00	1.00	0.91	1.00	0.91			

	Worksheet 2C Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections											
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Crash Severity Level	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
-		f T II 40 40		Parameter, k	Initial N _{bimv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bimv}		
	from Table 12-10		from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)			
	а	b	С	IIOIII Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)		
Total	-13.36	1.11	0.41	0.80	1.366	1.000	1.366	0.91	1.00	1.245		
Fotal and Injury (FI)	-14.01	1.16	0.30	0.69	0.474	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.460	0.91	1.00	0.419		
Fatal and Injury (FI)	-14.01	1.10	0.30	0.69	0.474	0.337	0.460	0.91	1.00	0.419		
Property Damage Only	45.00	4.00	0.54	0.77	0.005	(5) _{TOTAL} -(5) _{FI}	0.000	0.04	4.00	0.000		
(PDO)	-15.38	1.20	0.51	0.77	0.935	0.663	0.906	0.91	1.00	0.826		

	Worksheet 2D Multiple-	Vehicle Collisions by Collis	sion Type for Urban and Suburb	an Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bimv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv (TOTAL)} (crashes/year)
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C
Total	1.000	0.419	1.000	0.826	1.245
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.421	0.176	0.440	0.363	0.540
Head-on collision	0.045	0.019	0.023	0.019	0.038
Angle collision	0.343	0.144	0.262	0.216	0.360
Sideswipe	0.126	0.053	0.040	0.033	0.086
Other multiple-vehicle collision	0.065	0.027	0.235	0.194	0.221

		Worksheet	2E Single-\	ehicle Collisions by Severi	ty Level for Urban	and Suburban Arterial In	tersections			
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
		Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}		
Crash Severity Level	fr	om Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)
	a b c		from Table 12-12	(FI) from Eqn. 12-		(T)TOTAL (U)	Worksheet 2B		(0) (1) (0)	
	а	D	C		24 or 12-27					
Total	-6.81	0.16	0.51	1.14	0.288	1.000	0.288	0.91	1.00	0.262
Fotal and Injury (FI)					0.089	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.090	0.91	1.00	0.082
Fatal and Injury (FI)					0.009	0.314	0.090	0.91	1.00	0.062
Property Damage Only	0.00	0.05	0.55	4.00	0.405	(5) _{TOTAL} -(5) _{FI}	0.400	0.04	4.00	0.400
(PDO)	-8.36	0.25	0.55	1.29	0.195	0.686	0.198	0.91	1.00	0.180

	Worksheet 2F Single-V	ehicle Collisions by Collis	ion Type for Urban and Suburba	n Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bisv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv} (TOTAL) (crashes/year)
	from Table 12-13	(9)FI from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.082	1.000	0.180	0.262
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.003	0.001	0.001
Collision with animal	0.003	0.000	0.018	0.003	0.003
Collision with fixed object	0.762	0.063	0.834	0.150	0.213
Collision with other object	0.090	0.007	0.092	0.017	0.024
Other single-vehicle collision	0.039	0.003	0.023	0.004	0.007
Single-vehicle noncollision	0.105	0.009	0.030	0.005	0.014

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1) (2) (3) (4) (5) $(7)^*$									
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}				
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total	1.245	0.262	1.508	0.021	0.032				
Fatal and injury (FI)				-	0.032				

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections								
(1)	(1) (2) (3)								
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF						
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CiviF						
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)						
									

Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections										
(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level		SPF Coefficients			Overdispersion	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}	
Crash Severity Level		from Table 12-14					from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)
	а	b	С	d	е		II OIII Equation 12 20	(4) Hom Worksheet 211		(4) (0) (0)
Total									1.00	
Fatal and Injury (FI)							-		1.00	

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections										
(1)	(1) (2) (3) (4) (5)									
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}					
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)					
Total	1.245	0.262	1.508	0.016	0.024					
Fatal and injury (FI)				1	0.024					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksh	eet 2K Crash Severity Distribution for Urban a	nd Suburban Arterial Intersections	
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE	·	
Rear-end collisions (from Worksheet 2D)	0.176	0.363	0.540
Head-on collisions (from Worksheet 2D)	0.019	0.019	0.038
Angle collisions (from Worksheet 2D)	0.144	0.216	0.360
Sideswipe (from Worksheet 2D)	0.053	0.033	0.086
Other multiple-vehicle collision (from Worksheet 2D)	0.027	0.194	0.221
Subtotal	0.419	0.826	1.245
	SINGLE-VEHICLE		•
Collision with parked vehicle (from Worksheet 2F)	0.000	0.001	0.001
Collision with animal (from Worksheet 2F)	0.000	0.003	0.003
Collision with fixed object (from Worksheet 2F)	0.063	0.150	0.213
Collision with other object (from Worksheet 2F)	0.007	0.017	0.024
Other single-vehicle collision (from Worksheet 2F)	0.003	0.004	0.007
Single-vehicle noncollision (from Worksheet 2F)	0.009	0.005	0.014
Collision with pedestrian (from Worksheet 2G or 2I)	0.032	0.000	0.032
Collision with bicycle (from Worksheet 2J)	0.024	0.000	0.024
Subtotal	0.138	0.180	0.318
Total	0.557	1.006	1.563

Worksheet 2L Summary Results for Urban and Suburban Arterial Intersections							
(1)	(2)						
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)						
	(Total) from Worksheet 2K						
Total	1.6						
Fatal and injury (FI)	0.6						
Property damage only (PDO)	1.0						

	heet 2A General Information and Input	Data for Urban and Suburban Art			
General Informa	tion	Location Information			
Analyst	TL	Roadway	W. Gude Drive		
Agency or Company	ATCS	Intersection	W. Gude Drive at Research Boulevard		
Date Performed	12/07/21	Jurisdiction	Montgomery County		
		Analysis Year	2045		
Input Data		Base Conditions	Site Conditions		
Intersection type (3ST, 3SG, 4ST, 4SG)			4SG		
AADT _{major} (veh/day)	$AADT_{MAX} = 67,700 (veh/day)$	-	30,111		
AADT _{minor} (veh/day)	$AADT_{MAX} = 33,400$ (veh/day)		12,105		
Intersection lighting (present/not present)		Not Present	Present		
Calibration factor, C _i		1.00	1.00		
Data for unsignalized intersections only:					
Number of major-road approaches with left-turn land	es (0,1,2)	0			
Number of major-road approaches with right-turn la	nes (0,1,2)	0			
Data for signalized intersections only:					
Number of approaches with left-turn lanes (0,1,2,3,4	1) [for 3SG, use maximum value of 3]	0	4		
Number of approaches with right-turn lanes (0,1,2,3	,4) [for 3SG, use maximum value of 3]	0	3		
Number of approaches with left-turn signal phasing	[for 3SG, use maximum value of 3]		3		
Type of left-turn signal phasing for Leg #1		Permissive	Protected		
Type of left-turn signal phasing for Leg #2			Permissive / Protected		
Type of left-turn signal phasing for Leg #3			Permissive / Protected		
Type of left-turn signal phasing for Leg #4 (if application)	able)		Permissive		
Number of approaches with right-turn-on-red prohib	ited [for 3SG, use maximum value of 3]	0	0		
Intersection red light cameras (present/not present)		Not Present	Not Present		
Sum of all pedestrian crossing volumes (PedVol)			129		
Maximum number of lanes crossed by a pedestrian	,		7		
Number of bus stops within 300 m (1,000 ft) of the i		0	4		
Schools within 300 m (1,000 ft) of the intersection (Not Present	Not Present		
Number of alcohol sales establishments within 300	m (1,000 ft) of the intersection	0	0		

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections								
(1)	(2)	(3)	(4)	(5)	(6)	(7)			
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF			
	Phasing								
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}			
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)			
0.66	0.92	0.88	1.00	0.91	1.00	0.49			

	Worksheet 2C Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections											
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Crash Severity Level	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
-				Parameter, k	Initial N _{bimv}	Crashes	N _{bimv}	CMFs	Factor, C _i	N_{bimv}		
	fr	om Table 12-1	0	from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)		
	а	b	С	IIOIII Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)		
Total	-10.99	1.07	0.23	0.39	9.087	1.000	9.087	0.49	1.00	4.452		
Fotal and Injury (FI)	-13.14	1.18	0.22	0.33	2.996	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	3.100	0.49	1.00	1.519		
Fatal and Injury (FI)	-13.14	1.10	0.22	0.33	2.990	0.341	3.100	0.49	1.00	1.519		
Property Damage Only	44.00	4.00	0.04	0.44	E 70E	(5) _{TOTAL} -(5) _{FI}	5.007	0.40	4.00	0.000		
(PDO)	-11.02	1.02	0.24	0.44	5.785	0.659	5.987	0.49	1.00	2.933		

	Worksheet 2D Multiple-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(6)					
Collision Type	Proportion of Collision Type(FI)	Predicted N bimv (FI) (crashes/year)			Predicted N $_{bimv}$ (TOTAL) (crashes/year)					
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C					
Total	1.000	1.519	1.000	2.933	4.452					
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)					
Rear-end collision	0.450	0.684	0.483	1.417	2.100					
Head-on collision	0.049	0.074	0.030	0.088	0.162					
Angle collision	0.347	0.527	0.244	0.716	1.243					
Sideswipe	0.099	0.150	0.032	0.094	0.244					
Other multiple-vehicle collision	0.055	0.084	0.211	0.619	0.702					

		Worksheet	2E Single-\	ehicle Collisions by Severi	ity Level for Urban	and Suburban Arterial In	tersections			
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
				Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}
Crash Severity Level	fr	om Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)
	а	b	С	from Table 12-12	(FI) from Eqn. 12-		(T)TOTAL (U)	Worksheet 2B		(0) (1) (0)
	а	D	C		24 or 12-27					
Total	-10.21	0.68	0.27	0.36	0.517	1.000	0.517	0.49	1.00	0.253
Fotal and Injury (FI)	-9.25	0.43	0.29	0.09	0.124	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.125	0.49	1.00	0.061
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.124	0.242	0.125	0.49	1.00	0.061
Property Damage Only	44.04	0.70	0.05	0.44	0.000	(5) _{TOTAL} -(5) _{FI}	0.392	0.40	4.00	0.400
(PDO)	-11.34	0.78	0.25	0.44	0.388	0.388 0.758		0.49	1.00	0.192

	Worksheet 2F Single-V	ehicle Collisions by Collis	ion Type for Urban and Suburba	n Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bisv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv} (TOTAL) (crashes/year)
	from Table 12-13	(9)FI from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.061	1.000	0.192	0.253
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.000	0.001
Collision with fixed object	0.744	0.046	0.870	0.167	0.213
Collision with other object	0.072	0.004	0.070	0.013	0.018
Other single-vehicle collision	0.040	0.002	0.023	0.004	0.007
Single-vehicle noncollision	0.141	0.009	0.034	0.007	0.015

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(1) (2) (3) (4) (5)								
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}				
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total									
Fatal and injury (FI)				-					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections								
(1)	(1) (2) (3) (4)								
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF						
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CiviF						
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)						
4.15	1.00	1.00	4.15						

Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections										
(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	SPF Coefficients					Overdispersion	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}
Crash Seventy Level		fı	om Table 12-1	4		Parameter, k	from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)
	а	b	С	d	е		ITOTT Equation 12-23	(4) HOITI WORKSHEET ZIT		(4) (3) (0)
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.048	4.15	1.00	0.199
Fatal and Injury (FI)									1.00	0.199

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections										
(1)	(1) (2) (3) (4) (5) (7)*									
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}					
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)					
Total	4.452	0.253	4.705	0.015	0.071					
Fatal and injury (FI)					0.071					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksheet 2K Crash Severity Distribution for Urban and Suburban Arterial Intersections								
(1)	(2)	(3)	(4)					
	Fatal and injury (FI)	Property damage only (PDO)	Total					
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;					
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J					
	MULTIPLE-VEHICLE	•						
Rear-end collisions (from Worksheet 2D)	0.684	1.417	2.100					
Head-on collisions (from Worksheet 2D)	0.074	0.088	0.162					
Angle collisions (from Worksheet 2D)	0.527	0.716	1.243					
Sideswipe (from Worksheet 2D)	0.150	0.094	0.244					
Other multiple-vehicle collision (from Worksheet 2D)	0.084	0.619	0.702					
Subtotal	1.519	2.933	4.452					
	SINGLE-VEHICLE							
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000					
Collision with animal (from Worksheet 2F)	0.000	0.000	0.001					
Collision with fixed object (from Worksheet 2F)	0.046	0.167	0.213					
Collision with other object (from Worksheet 2F)	0.004	0.013	0.018					
Other single-vehicle collision (from Worksheet 2F)	0.002	0.004	0.007					
Single-vehicle noncollision (from Worksheet 2F)	0.009	0.007	0.015					
Collision with pedestrian (from Worksheet 2G or 2I)	0.199	0.000	0.199					
Collision with bicycle (from Worksheet 2J)	0.071	0.000	0.071					
Subtotal	0.330	0.192	0.523					
Total	1.849	3.125	4.975					

Worksheet 2L Summary Results for Urban and Suburban Arterial Intersections							
(1)	(2)						
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)						
	(Total) from Worksheet 2K						
Total	5.0						
Fatal and injury (FI)	1.8						
Property damage only (PDO)	3.1						

		tion and input b	ata for Urban and Suburbar			
General Information				Locat	ion Information	
Analyst	TL		Roadway		W. Gude Drive	
Agency or Company	ATC	3	Roadway Section		250 ft east of Research Blvd to I-270 ML Ramps	
Date Performed	12/07/21		Jurisdiction		Montgomery County	
			Analysis Year		2045	
Input Data			Base Conditions		Site Conditions	
Roadway type (2U, 3T, 4U, 4D, ST)					4D	
Length of segment, L (mi)				0.06		
AADT (veh/day)	$AADT_{MAX} = 66,0$	000 (veh/day)			35,153	
Type of on-street parking (none/parallel/angle)			None	None		
Proportion of curb length with on-street parking						
Median width (ft) - for divided only			15		10	
Lighting (present / not present)			Not Present	Present		
Auto speed enforcement (present / not present)			Not Present	Not Present		
Major commercial driveways (number)				0		
Minor commercial driveways (number)				0		
Major industrial / institutional driveways (number)					0	
Minor industrial / institutional driveways (number)					0	
Major residential driveways (number)				0		
Minor residential driveways (number)	·	-			0	
Other driveways (number)					0	
Speed Category					Posted Speed Greater than 30 mph	
Roadside fixed object density (fixed objects / mi)			0		50	
Offset to roadside fixed objects (ft) [If greater than 30 or Not Pr	esent, input 30]		30	6		
Calibration Factor, Cr			1.00		1.00	

	Worksheet 1B Crash Modification Factors for Urban and Suburban Roadway Segments								
(1)	1) (2) (3) (4) (5)								
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF				
CMF 1r	CMF 2r	CMF 3r	CMF 4r	CMF 5r	CMF comb				
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)				
1.00	1.18	1.01	0.91	1.00	1.09				

	Workshee	t 1C Multipl	le-Vehicle Nondriveway Co	Worksheet 1C Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments									
(1)	(2	2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)				
Crash Severity Level	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted				
			Parameter, k	Initial N _{brmv}	Crashes	N_{brmv}	CMFs	Factor, Cr	N _{brmv}				
	from Ta	ble 12-3	from Table 12-3	from Equation 12-10		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)				
	а	р	IIOIII Table 12-3	Hom Equation 12-10		(4)IOIAL (0)			(0) (1) (0)				
Total	-12.34	1.36	1.32	0.399	1.000	0.399	1.09	1.00	0.434				
Fatal and Injury (FI)	-12.76	1.28	1.31	0.114	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.108	1.09	4.00	0.117				
ratai and injury (FI)	-12.70	1.20	1.31	0.114	0.270	0.100	1.09	1.00	0.117				
D	40.04	4.00	4.04	0.000	(5) _{TOTAL} -(5) _{FI}	0.000	4.00	4.00	0.047				
Property Damage Only (PDO)	-12.81	1.38	1.34	0.308	0.730	0.292	1.09	1.00	0.317				

Wor	rksheet 1D Multiple-Vehicle No	ndriveway Collisions by	Collision Type for Urban an	d Suburban Roadway Se	egments
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N brmv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N brmv (PDO) (crashes/year)	Predicted N _{brmv (TOTAL)} (crashes/year)
	from Table 12-4	(9)FI from Worksheet 1C	from Table 12-4	(9)PDO from Worksheet 1C	(9)TOTAL from Worksheet 1C
Total	1.000	0.117	1.000	0.317	0.434
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.832	0.097	0.662	0.210	0.307
Head-on collision	0.020	0.002	0.007	0.002	0.005
Angle collision	0.040	0.005	0.036	0.011	0.016
Sideswipe, same direction	0.050	0.006	0.223	0.071	0.077
Sideswipe, opposite direction	0.010	0.001	0.001	0.000	0.001
Other multiple-vehicle collision	0.048	0.006	0.071	0.023	0.028

	Worksheet 1E Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments								
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
Crash Severity Level			Parameter, k	Initial N _{brsv}	Crashes	N _{brsv}	CMFs	Factor, Cr	N _{brsv}
Clash Seventy Level	from Ta	ble 12-5	from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)
	а	b	Hom rable 12-5	nom Equation 12-13		(4)TOTAL (0)	Worksheet 1B		
Total	-5.05	0.47	0.86	0.053	1.000	0.053	1.09	1.00	0.057
Fatal and Injury (FI)	-8.71	0.66	0.28	0.010	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.010	1.09	1.00	0.011
ratarana injury (i i)	-0.71	0.00	0.20	0.010	0.187	0.010	1.03	1.00	0.011
Property Demoge Only (PDO)	-5.04	0.45	1.06	0.043	(5) _{TOTAL} -(5) _{FI}	0.043	1.09	1.00	0.047
Property Damage Only (PDO)	-5.04	0.45	1.06	0.043	0.813	0.043	1.09	1.00	0.047

	Worksheet 1F Single-Vehi	cle Collisions by Collision	n Type for Urban and Subu	rban Roadway Segments		
(1)	(2)	(3)	(4)	(5)	(6)	
	Proportion of Collision	Predicted N brsv (FI)	Proportion of Collision	Predicted N brsv (PDO)		
	Type _(FI)	(crashes/year)	Type _(PDO)	(crashes/year)	Predicted N _{brsv (TOTAL)} (crashes/year)	
Collision Type						
	from Table 12-6	(9)FI from Worksheet 1E	from Table 12-6	(9)PDO from Worksheet	(9)TOTAL from Worksheet 1E	
		(*)************************************		1E	(-, -	
Total	1.000	0.011	1.000	0.047	0.057	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Collision with animal	0.001	0.000	0.063	0.003	0.003	
Collision with fixed object	0.500	0.005	0.813	0.038	0.043	
Collision with other object	0.028	0.000	0.016	0.001	0.001	
Other single-vehicle collision	0.471	0.005	0.108	0.005	0.010	

Work	ksheet 1G Multiple-Vehicle Drive	way-Related Collisions by	y Driveway Type for Urban	and Suburban Roadway Segments	
(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	Number of driveways,	Crashes per driveway per year, N _j	Coefficient for traffic adjustment, t	Initial N _{brdwy}	Overdispersion parameter, k
	n _j	from Table 12-7	from Table 12-7	Equation 12-16	from Table 12-7
		0.000	1.100	n _j * N _j * (AADT/15,000) ^t	
Major commercial	U	0.033	1.106	0.000	
Minor commercial	0	0.011	1.106	0.000	
Major industrial/institutional	0	0.036	1.106	0.000	
Minor industrial/institutional	0	0.005	1.106	0.000	
Major residential	0	0.018	1.106	0.000	
Minor residential	0	0.003	1.106	0.000	
Other	0	0.005	1.106	0.000	
Total	==			0.000	1.39

Worksheet 1H Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	
Crash Severity Level	Initial N _{brdwy}	Proportion of total crashes (f _{dwy})	Adjusted N _{brdwy}	Combined CMFs	Calibration factor, C,	Predicted N _{brdwy}	
	(5) _{TOTAL} from Worksheet 1G	from Table 12-7	(2) _{TOTAL} * (3)	(6) from Worksheet 1B	, ,	(4)*(5)*(6)	
Total	0.000	1.000	0.000	1.09	1.00	0.000	
Fatal and injury (FI)		0.284	0.000	1.09	1.00	0.000	
Property damage only (PDO)		0.716	0.000	1.09	1.00	0.000	

Worksheet 1I Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(8)*		
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{pedr}	Predicted N _{pedr}		
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8	(5)*(6)		
otal	0.434	0.057	0.000	0.491	0.019	0.009		
atal and injury (FI)						0.009		

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-19

Worksheet 1J Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(8)*		
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{biker}	Predicted N _{biker}		
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9	(5)*(6)		
Total	0.434	0.057	0.000	0.491	0.005	0.002		
Fatal and injury (FI)						0.002		

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-20

(1)	(2)	(3)	(4)
(*/	Fatal and injury (FI)	Property damage only (PDO)	Total
N=11!=!=== 4	(3) from Worksheet 1D and 1F;	(5) from Worksheet 1D and 1F; and	(6) from Worksheet 1D and 1F;
Collision type	(7) from Worksheet 1H; and	(7) from Worksheet 1H	(7) from Worksheet 1H; and
	(8) from Worksheet 1I and 1J		(8) from Worksheet 1I and 1J
	MULTIPLE-VEHICLE		
Rear-end collisions (from Worksheet 1D)	0.097	0.210	0.307
lead-on collisions (from Worksheet 1D)	0.002	0.002	0.005
ingle collisions (from Worksheet 1D)	0.005	0.011	0.016
Sideswipe, same direction (from Worksheet 1D)	0.006	0.071	0.077
Sideswipe, opposite direction (from Worksheet 1D)	0.001	0.000	0.001
Priveway-related collisions (from Worksheet 1H)	0.000	0.000	0.000
Other multiple-vehicle collision (from Worksheet 1D)	0.006	0.023	0.028
Subtotal	0.117	0.317	0.434
	SINGLE-VEHICLE		
Collision with animal (from Worksheet 1F)	0.000	0.003	0.003
Collision with fixed object (from Worksheet 1F)	0.005	0.038	0.043
Collision with other object (from Worksheet 1F)	0.000	0.001	0.001
Other single-vehicle collision (from Worksheet 1F)	0.005	0.005	0.010
Collision with pedestrian (from Worksheet 1I)	0.009	0.000	0.009
Collision with bicycle (from Worksheet 1J)	0.002	0.000	0.002
Subtotal	0.022	0.047	0.069
otal	0.140	0.364	0.503

Worksheet 1L Summary Results for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)					
Crash Severity Level	Predicted average crash frequency, N predicted rs (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)					
	(Total) from Worksheet 1K		(2) / (3)					
Total	0.5	0.06	8.4					
Fatal and injury (FI)	0.1	0.06	2.3					
Property damage only (PDO)	0.4	0.06	6.1					

Works	heet 2A General Information and Input	Data for Urban and Suburban A	rterial Intersect	tions
General Informa	tion		Locatio	on Information
Analyst	TL	Roadway		W. Gude Drive
Agency or Company	ATCS	Intersection		W. Gude Drive at I-270 ML Ramps
Date Performed	12/07/21	Jurisdiction		Montgomery County
		Analysis Year		2045
Input Data		Base Conditions	Site Conditions	
Intersection type (3ST, 3SG, 4ST, 4SG)				4SG
AADT _{major} (veh/day)	$AADT_{MAX} = 67,700$ (veh/day)	-		37,590
AADT _{minor} (veh/day)	$AADT_{MAX} = 33,400$ (veh/day)			16,827
Intersection lighting (present/not present)		Not Present		Present
Calibration factor, C _i		1.00		1.00
Data for unsignalized intersections only:				
Number of major-road approaches with left-turn land	0			
Number of major-road approaches with right-turn la	nes (0,1,2)	0		
Data for signalized intersections only:				
Number of approaches with left-turn lanes (0,1,2,3,4	4) [for 3SG, use maximum value of 3]	0	4	
Number of approaches with right-turn lanes (0,1,2,3	,4) [for 3SG, use maximum value of 3]	0	3	
Number of approaches with left-turn signal phasing	[for 3SG, use maximum value of 3]			4
Type of left-turn signal phasing for Leg #1		Permissive		Protected
Type of left-turn signal phasing for Leg #2				Protected
Type of left-turn signal phasing for Leg #3				Protected
Type of left-turn signal phasing for Leg #4 (if applica	able)			Protected
Number of approaches with right-turn-on-red prohib	ited [for 3SG, use maximum value of 3]	0		0
Intersection red light cameras (present/not present)		Not Present		Not Present
Sum of all pedestrian crossing volumes (PedVol)	Signalized intersections only			231
Maximum number of lanes crossed by a pedestrian	(n _{lanesx})			6
Number of bus stops within 300 m (1,000 ft) of the i		0		0
Schools within 300 m (1,000 ft) of the intersection (p		Not Present		Not Present
Number of alcohol sales establishments within 300	m (1,000 ft) of the intersection	0		0

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections								
(1)	(2)	(3)	(4)	(5)	(6)	(7)			
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF			
	Phasing								
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}			
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)			
0.66	0.78	0.88	1.00	0.91	1.00	0.42			

	Worksheet 2C Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections											
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Crash Severity Level	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted			
-			Parameter, k	Initial N _{bimv}	Crashes	N _{bimv}	CMFs	Factor, C _i	N_{bimv}			
	fr	om Table 12-1	0	from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from	(6)*(7)*(8)			
	а	b	С	IIOIII Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)		
Total	-10.99	1.07	0.23	0.39	12.428	1.000	12.428	0.42	1.00	5.160		
Fotal and Injury (FI)	-13.14	1.18	0.22	0.33	4.185	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	4.322	0.42	1.00	1.794		
Fatal and Injury (FI)	-13.14	1.10	0.22	0.33	4.100	0.348	4.322	0.42	1.00	1.794		
Property Damage Only	44.00	4.00	0.04	0.44	7.050	(5) _{TOTAL} -(5) _{FI}	0.407	0.40	4.00	0.000		
(PDO)	-11.02	1.02	0.24	0.44	7.850	0.652	8.107	0.42	1.00	3.366		

	Worksheet 2D Multiple-	Vehicle Collisions by Collis	sion Type for Urban and Suburb	an Arterial Intersections		
(1)	(2)	(3)	(4)	(5)	(6) Predicted N _{bimv (TOTAL)} (crashes/year)	
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bimv} (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)		
	from Table 12-11	(9) _{FI} from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C	
Total	1.000	1.794	1.000	3.366	5.160	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Rear-end collision	0.450	0.807	0.483	1.626	2.433	
Head-on collision	0.049	0.088	0.030	0.101	0.189	
Angle collision	0.347	0.623	0.244	0.821	1.444	
Sideswipe	0.099	0.178	0.032	0.108	0.285	
Other multiple-vehicle collision	0.055	0.099	0.211	0.710	0.809	

		Worksheet	2E Single-\	ehicle Collisions by Severi	ity Level for Urban	and Suburban Arterial In	tersections			
(1)		(2)		(2) (3) (4) (5)		(5)	(6)	(7)	(8)	(9)
	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
					Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}
Crash Severity Level	fr	om Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from	Ī	(6)*(7)*(8)
	а	b	С	from Table 12-12	(FI) from Eqn. 12-		(T)TOTAL (U)	Worksheet 2B	i 📄	(0) (1) (0)
	а	D	C		24 or 12-27					
Total	-10.21	0.68	0.27	0.36	0.658	1.000	0.658	0.42	1.00	0.273
Fotal and Injury (FI)	-9.25	0.43	0.29	0.09	0.150	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.151	0.42	1.00	0.063
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.150	0.230	0.151	0.42	1.00	0.003
Property Damage Only	44.04	0.70	0.05	0.44	0.504	(5) _{TOTAL} -(5) _{FI}	0.500	0.40	4.00	0.040
(PDO)	-11.34	0.78	0.25	0.44	0.501	0.770	0.506	0.42	1.00	0.210

	Worksheet 2F Single-V	ehicle Collisions by Collisi	on Type for Urban and Suburba	n Arterial Intersections		
(1)	(2)	(3)	(4)	(5)	(6)	
Collision Type	Proportion of Collision Type(FI)	Predicted N _{bisv} (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv (TOTAL)} (crashes/year)	
	from Table 12-13	(9)FI from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E	
Total	1.000	0.063	1.000	0.210	0.273	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000	
Collision with animal	0.002	0.000	0.002	0.000	0.001	
Collision with fixed object	0.744	0.047	0.870	0.183	0.230	
Collision with other object	0.072	0.005	0.070	0.015	0.019	
Other single-vehicle collision	0.040	0.003	0.023	0.005	0.007	
Single-vehicle noncollision	0.141	0.009	0.034	0.007	0.016	

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(1) (2) (3) (4) (5)								
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}				
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total				-					
Fatal and injury (FI)				-					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections									
(1)	(1) (2) (3)									
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF							
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CiviF							
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)							
1.00	1.00	1.00	1.00							

Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections											
(1)	(2)					(3)	(4)	(5)	(6)	(7)	
Crash Severity Level	SPF Coefficients					Overdispersion	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}	
Crash Seventy Level		fı	om Table 12-1	4		Parameter, k	from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)	
	а	b	С	d	е		IIOIII Equation 12-25	(4) HOITI WORKSHEET ZIT		(4) (3) (0)	
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.068	1.00	1.00	0.068	
Fatal and Injury (FI)									1.00	0.068	

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections									
(1)	(1) (2) (3) (4) (5)								
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}				
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)				
Total	5.160	0.273	5.433	0.015	0.081				
Fatal and injury (FI)					0.081				

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksh	eet 2K Crash Severity Distribution for Urban a	nd Suburban Arterial Intersections	
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE		• • •
Rear-end collisions (from Worksheet 2D)	0.807	1.626	2.433
Head-on collisions (from Worksheet 2D)	0.088	0.101	0.189
Angle collisions (from Worksheet 2D)	0.623	0.821	1.444
Sideswipe (from Worksheet 2D)	0.178	0.108	0.285
Other multiple-vehicle collision (from Worksheet 2D)	0.099	0.710	0.809
Subtotal	1.794	3.366	5.160
	SINGLE-VEHICLE		
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.001
Collision with fixed object (from Worksheet 2F)	0.047	0.183	0.230
Collision with other object (from Worksheet 2F)	0.005	0.015	0.019
Other single-vehicle collision (from Worksheet 2F)	0.003	0.005	0.007
Single-vehicle noncollision (from Worksheet 2F)	0.009	0.007	0.016
Collision with pedestrian (from Worksheet 2G or 2I)	0.068	0.000	0.068
Collision with bicycle (from Worksheet 2J)	0.081	0.000	0.081
Subtotal	0.212	0.210	0.423
Total	2.007	3.576	5.583

Worksheet 2L Summary Resu	Worksheet 2L Summary Results for Urban and Suburban Arterial Intersections							
(1)	(2)							
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)							
	(Total) from Worksheet 2K							
Total	5.6							
Fatal and injury (FI)	2.0							
Property damage only (PDO)	3.6							

Worksheet	1A General Ir	nformation	and Input Da	ata for Urban and Suburbar	n Roadway	Segments	
General Information			-	Location Information			
Analyst		TL		Roadway		W. Gude Drive	
Agency or Company		ATCS		Roadway Section		I-270 ML Ramps to 250 ft west of Piccard Dr	
Date Performed	12/07/21			Jurisdiction		Montgomery County	
				Analysis Year		2045	
Input Data	•			Base Conditions		Site Conditions	
Roadway type (2U, 3T, 4U, 4D, ST)						4D	
Length of segment, L (mi)						0.04	
AADT (veh/day)	$AADT_{MAX} =$	66,000	(veh/day)			40,027	
Type of on-street parking (none/parallel/angle)				None	None		
Proportion of curb length with on-street parking							
Median width (ft) - for divided only				15		10	
Lighting (present / not present)				Not Present		Present	
Auto speed enforcement (present / not present)				Not Present		Not Present	
Major commercial driveways (number)						0	
Minor commercial driveways (number)						0	
Major industrial / institutional driveways (number)						0	
Minor industrial / institutional driveways (number)						0	
Major residential driveways (number)						0	
Minor residential driveways (number)						0	
Other driveways (number)						0	
Speed Category						Posted Speed Greater than 30 mph	
Roadside fixed object density (fixed objects / mi)				0		75	
Offset to roadside fixed objects (ft) [If greater than 30 or Not Pro	esent, input 30]			30		6	
Calibration Factor, Cr				1.00		1.00	

Worksheet 1B Crash Modification Factors for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)			
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF			
CMF 1r	CMF 2r	CMF 3r	CMF 4r	CMF 5r	CMF comb			
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)			
1.00	1.28	1.01	0.91	1.00	1.19			

	Worksheet 1C Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments									
(1)	(2	2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
Crash Severity Level	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
			Parameter, k	Initial N _{brmv}	Crashes	N_{brmv}	CMFs	Factor, Cr	N_{brmv}	
	from Ta	ble 12-3	from Table 12-3	from Equation 12-10		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)	
	a	b	IIOIII Table 12-3	ITOTT Equation 12-10		(+)TOTAL (3)	Worksheet 1B			
Total	-12.34	1.36	1.32	0.318	1.000	0.318	1.19	1.00	0.377	
Fatal and Injury (FI)	-12.76	1.28	1.31	0.089	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.085	1.19	1.00	0.101	
ratai and injury (FI)	-12.70	1.20	1.31	0.089	0.267	0.065	1.19	1.00	0.101	
Promonty Domono Only (PDO)	40.04	4.20	4.04	0.045	(5) _{TOTAL} -(5) _{FI}	0.000	1.10	1.00	0.076	
Property Damage Only (PDO)	-12.81	1.38	1.34	0.245	0.733	0.233	1.19	1.00	0.276	

Work	sheet 1D Multiple-Vehicle No	ndriveway Collisions by	Collision Type for Urban ar	id Suburban Roadway Se	egments	
(1)	(2)	(3)	(4)	(5)	(6)	
Collision Type	Proportion of Collision Type _(FI)	Predicted N brmv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N brmv (PDO) (crashes/year)	Predicted N _{brmv (TOTAL)} (crashes/year)	
	from Table 12-4	(9)FI from Worksheet 1C	from Table 12-4	(9)PDO from Worksheet 1C	(9)TOTAL from Worksheet 1C	
Total	1.000	0.101	1.000	0.276	0.377	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Rear-end collision	0.832	0.084	0.662	0.183	0.266	
Head-on collision	0.020	0.002	0.007	0.002	0.004	
Angle collision	0.040	0.004	0.036	0.010	0.014	
Sideswipe, same direction	0.050	0.005	0.223	0.062	0.067	
Sideswipe, opposite direction	0.010	0.001	0.001	0.000	0.001	
Other multiple-vehicle collision	0.048	0.005	0.071	0.020	0.024	

	Worksheet 1E Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments									
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
Crash Severity Level			Parameter, k	Initial N _{brsv}	Crashes	N _{brsv}	CMFs	Factor, Cr	N_{brsv}	
Orasii Geventy Level	from Ta	ble 12-5	from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)	
	а	b	Hom rable 12-5	Hom Equation 12-13		(T)TOTAL (O)	Worksheet 1B		(0) (1) (0)	
Total	-5.05	0.47	0.86	0.037	1.000	0.037	1.19	1.00	0.044	
Fatal and Injury (FI)	-8.71	0.66	0.28	0.007	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.007	1.19	1.00	0.008	
i atai and injury (i i)	-0.71	0.00	0.20	0.007	0.191	0.007	1.19	1.00	0.000	
Preparty Damage Only (PDO)	-5.04	0.45	1.06	0.020	(5) _{TOTAL} -(5) _{FI}	0.030	1.19	1.00	0.036	
Property Damage Only (PDO)	-5.04	0.45	1.06	0.030	0.809	0.030	1.19	1.00	0.036	

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N brsv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N brsv (PDO) (crashes/year)	Predicted N _{brsv (TOTAL)} (crashes/year)
,	from Table 12-6	(9) _{FI} from Worksheet 1E	from Table 12-6	(9)PDO from Worksheet 1E	(9)TOTAL from Worksheet 1E
Total	1.000	0.008	1.000	0.036	0.044
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.001	0.000	0.063	0.002	0.002
Collision with fixed object	0.500	0.004	0.813	0.029	0.033
Collision with other object	0.028	0.000	0.016	0.001	0.001
Other single-vehicle collision	0.471	0.004	0.108	0.004	0.008

Work	sheet 1G Multiple-Vehicle Drive	way-Related Collisions by	y Driveway Type for Urban	and Suburban Roadway Segments	
(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	Number of driveways,	Crashes per driveway per year, N _j	Coefficient for traffic adjustment, t	Initial N _{brdwy}	Overdispersion parameter, k
	n _j	from Table 12-7	from Table 12-7	Equation 12-16	from Table 12-7
	-	HOIH TABLE 12-7	HOIH Table 12-7	n _j * N _j * (AADT/15,000) ^t	IIOIII Table 12-7
Major commercial	0	0.033	1.106	0.000	
Minor commercial	0	0.011	1.106	0.000	
Major industrial/institutional	0	0.036	1.106	0.000	
Minor industrial/institutional	0	0.005	1.106	0.000	
Major residential	0	0.018	1.106	0.000	
Minor residential	0	0.003	1.106	0.000	
Other	0	0.005	1.106	0.000	
Total				0.000	1.39

Worksheet 1H Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(7)		
Crash Severity Level	Initial N _{brdwy}	Proportion of total crashes (f _{dwy})	Adjusted N _{brdwy}	Combined CMFs	Calibration factor, C,	Predicted N _{brdwy}		
	(5) _{TOTAL} from Worksheet 1G	from Table 12-7	(2) _{TOTAL} * (3)	(6) from Worksheet 1B	, ·	(4)*(5)*(6)		
Total	0.000	1.000	0.000	1.19	1.00	0.000		
Fatal and injury (FI)		0.284	0.000	1.19	1.00	0.000		
Property damage only (PDO)		0.716	0.000	1.19	1.00	0.000		

	Worksheet 1I Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(8)*			
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{pedr}	Predicted N _{pedr}			
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8	(5)*(6)			
Total	0.377	0.044	0.000	0.421	0.019	0.008			
Fatal and injury (FI)						0.008			

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-19

	Worksheet 1J Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(8)*			
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{biker}	Predicted N _{biker}			
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9	(5)*(6)			
Total	0.377	0.044	0.000	0.421	0.005	0.002			
Fatal and injury (FI)						0.002			

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-20

(1)	(2)	(3)	(4)
()	Fatal and injury (FI)	Property damage only (PDO)	Total
n 111 - 1	(3) from Worksheet 1D and 1F;	(5) from Worksheet 1D and 1F; and	(6) from Worksheet 1D and 1F;
Collision type	(7) from Worksheet 1H; and	(7) from Worksheet 1H	(7) from Worksheet 1H; and
	(8) from Worksheet 1I and 1J	, ,	(8) from Worksheet 1I and 1J
	MULTIPLE-VEHICLE	•	
Rear-end collisions (from Worksheet 1D)	0.084	0.183	0.266
Head-on collisions (from Worksheet 1D)	0.002	0.002	0.004
Angle collisions (from Worksheet 1D)	0.004	0.010	0.014
Sideswipe, same direction (from Worksheet 1D)	0.005	0.062	0.067
Sideswipe, opposite direction (from Worksheet 1D)	0.001	0.000	0.001
Oriveway-related collisions (from Worksheet 1H)	0.000	0.000	0.000
Other multiple-vehicle collision (from Worksheet 1D)	0.005	0.020	0.024
Subtotal	0.101	0.276	0.377
	SINGLE-VEHICLE		
Collision with animal (from Worksheet 1F)	0.000	0.002	0.002
Collision with fixed object (from Worksheet 1F)	0.004	0.029	0.033
Collision with other object (from Worksheet 1F)	0.000	0.001	0.001
Other single-vehicle collision (from Worksheet 1F)	0.004	0.004	0.008
Collision with pedestrian (from Worksheet 1I)	0.008	0.000	0.008
Collision with bicycle (from Worksheet 1J)	0.002	0.000	0.002
Subtotal	0.019	0.036	0.054
Total	0.119	0.312	0.431

Worksheet 1L Summary Results for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)					
Crash Severity Level	Predicted average crash frequency, N predicted rs (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)					
	(Total) from Worksheet 1K		(2) / (3)					
Total	0.4	0.04	10.8					
Fatal and injury (FI)	0.1	0.04	3.0					
Property damage only (PDO)	0.3	0.04	7.8					

	heet 2A General Information and Input	Data for Urban and Suburban Art	
General Informa	tion		Location Information
Analyst	TL	Roadway	W. Gude Drive
Agency or Company	ATCS	Intersection	W. Gude Drive at Piccard Drive
Date Performed	12/07/21	Jurisdiction	Montgomery County
		Analysis Year	2045
Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)			3SG
AADT _{major} (veh/day)	$AADT_{MAX} = 58,100$ (veh/day)	-	30,375
AADT _{minor} (veh/day)	$AADT_{MAX} = 16,400$ (veh/day)		7,707
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C _i		1.00	1.00
Data for unsignalized intersections only:			
Number of major-road approaches with left-turn lanes (0,1,2)		0	
Number of major-road approaches with right-turn la	nes (0,1,2)	0	
Data for signalized intersections only:			
Number of approaches with left-turn lanes (0,1,2,3,4	1) [for 3SG, use maximum value of 3]	0	2
Number of approaches with right-turn lanes (0,1,2,3	,4) [for 3SG, use maximum value of 3]	0	2
Number of approaches with left-turn signal phasing	[for 3SG, use maximum value of 3]		2
Type of left-turn signal phasing for Leg #1		Permissive	Permissive / Protected
Type of left-turn signal phasing for Leg #2			Not Applicable
Type of left-turn signal phasing for Leg #3			Protected
Type of left-turn signal phasing for Leg #4 (if application)	able)		Not Applicable
Number of approaches with right-turn-on-red prohib	ited [for 3SG, use maximum value of 3]	0	0
Intersection red light cameras (present/not present)		Not Present	Not Present
Sum of all pedestrian crossing volumes (PedVol)			231
Maximum number of lanes crossed by a pedestrian	(n _{lanesx})		5
Number of bus stops within 300 m (1,000 ft) of the i		0	2
Schools within 300 m (1,000 ft) of the intersection (p		Not Present	Not Present
Number of alcohol sales establishments within 300	m (1,000 ft) of the intersection	0	0

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections								
(1)	(2)	(3)	(4)	(5)	(6)	(7)			
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF			
	Phasing								
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}			
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)			
0.86	0.98	0.92	1.00	0.91	1.00	0.71			

	Worksheet 2C Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections												
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)			
Crash Severity Level	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted			
-		f T. I.I. 40.40		Parameter, k	Initial N _{bimv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bimv}			
	from Table 12-10		from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from	[(6)*(7)*(8)				
	а	b	С	IIOIII Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)			
Total	-12.13	1.11	0.26	0.33	5.226	1.000	5.226	0.71	1.00	3.697			
Fotol and Injury (FI)	-11.58	1.02	0.17	0.30	1.599	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	1.686	0.71	1.00	1.193			
Fatal and Injury (FI)	-11.50	1.02	0.17	1.02 0.17	0.30	0.30	0.17	1.599	0.323	1.000	0.71	1.00	1.193
Property Damage Only (PDO)	-13.24	1.14	0.30	0.36	3.358	(5) _{TOTAL} -(5) _{FI} 0.677	3.540	0.71	1.00	2.505			

	Worksheet 2D Multiple-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections								
(1)	(2)	(3)	(4)	(5)	(6)				
Collision Type	Proportion of Collision Type(FI)	Predicted N bimv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv (TOTAL)} (crashes/year)				
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C				
Total	1.000	1.193	1.000	2.505	3.697				
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)				
Rear-end collision	0.549	0.655	0.546	1.368	2.022				
Head-on collision	0.038	0.045	0.020	0.050	0.095				
Angle collision	0.280	0.334	0.204	0.511	0.845				
Sideswipe	0.076	0.091	0.032	0.080	0.171				
Other multiple-vehicle collision	0.057	0.068	0.198	0.496	0.564				

		Worksheet	2E Single-\	ehicle Collisions by Severi	ity Level for Urban	and Suburban Arterial In	tersections			
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
	SPF Coefficients		SPF Coefficients			Proportion of Total	Adjusted	Combined	Calibration	Predicted
		Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}		
Crash Severity Level	fr	om Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)
		a b	С	from Table 12-12	(FI) from Eqn. 12-	(+)TOTAL		Worksheet 2B		(0) (1) (0)
	а	D	C		24 or 12-27					
Total	-9.02	0.42	0.40	0.36	0.331	1.000	0.331	0.71	1.00	0.234
Fotal and Injury (FI)	-9.75	0.27	0.51	0.24	0.091	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.095	0.71	1.00	0.067
Fatal and Injury (FI)	-9.75	0.27	0.51	0.24	0.091	0.286	0.095	0.71	1.00	0.007
Property Damage Only	0.00	0.45	0.00	0.50	0.007	(5) _{TOTAL} -(5) _{FI}	0.007	0.74	4.00	0.407
(PDO)	-9.08	0.45	0.33	0.53	0.227	0.714	0.237	0.71	1.00	0.167

	Worksheet 2F Single-V	ehicle Collisions by Collis	ion Type for Urban and Suburba	n Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bisv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv} (TOTAL) (crashes/year)
	from Table 12-13	(9)FI from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.067	1.000	0.167	0.234
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.001	0.000	0.003	0.001	0.001
Collision with fixed object	0.653	0.044	0.895	0.150	0.194
Collision with other object	0.091	0.006	0.069	0.012	0.018
Other single-vehicle collision	0.045	0.003	0.018	0.003	0.006
Single-vehicle noncollision	0.209	0.014	0.014	0.002	0.016

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(1) (2) (3) (4) (5) $(7)^*$								
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}				
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total				-					
Fatal and injury (FI)				-					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections								
(1)	(1) (2) (3) (4)								
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF						
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined Civir						
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)						
2.78	1.00	1.00	2.78						

	Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections										
(1)		(2)					(4)	(5)	(6)	(7)	
Crash Severity Level	SPF Coefficients					Overdispersion	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}	
Clash Severity Level		from Table 12-14					arameter, k from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)	
	а	b	С	d	е		II OIII Equation 12 20	(4) HOIH WORKSHOOL ZIT		(4) (0) (0)	
Total	-6.60	0.05	0.24	0.41	0.09	0.52	0.024	2.78	1.00	0.067	
Fatal and Injury (FI)		-					-		1.00	0.067	

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections										
(1)	(2)	(2) (3) (4) (5)								
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}					
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)					
Total	3.697	0.234	3.932	0.011	0.043					
Fatal and injury (FI)					0.043					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksh	Worksheet 2K Crash Severity Distribution for Urban and Suburban Arterial Intersections							
(1)	(2)	(3)	(4)					
	Fatal and injury (FI)	Property damage only (PDO)	Total					
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;					
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J					
	MULTIPLE-VEHICLE	•						
Rear-end collisions (from Worksheet 2D)	0.655	1.368	2.022					
Head-on collisions (from Worksheet 2D)	0.045	0.050	0.095					
Angle collisions (from Worksheet 2D)	0.334	0.511	0.845					
Sideswipe (from Worksheet 2D)	0.091	0.080	0.171					
Other multiple-vehicle collision (from Worksheet 2D)	0.068	0.496	0.564					
Subtotal	1.193	2.505	3.697					
	SINGLE-VEHICLE							
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000					
Collision with animal (from Worksheet 2F)	0.000	0.001	0.001					
Collision with fixed object (from Worksheet 2F)	0.044	0.150	0.194					
Collision with other object (from Worksheet 2F)	0.006	0.012	0.018					
Other single-vehicle collision (from Worksheet 2F)	0.003	0.003	0.006					
Single-vehicle noncollision (from Worksheet 2F)	0.014	0.002	0.016					
Collision with pedestrian (from Worksheet 2G or 2I)	0.067	0.000	0.067					
Collision with bicycle (from Worksheet 2J)	0.043	0.000	0.043					
Subtotal	0.178	0.167	0.345					
Total	1.370	2.672	4.042					

Worksheet 2L Summary Results for Urban and Suburban Arterial Intersections						
(1)	(2)					
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)					
	(Total) from Worksheet 2K					
Total	4.0					
Fatal and injury (FI)	1.4					
Property damage only (PDO)	2.7					

0	Worksheet 2A General Information and Input	Data for Orban and Subdiban Ar	
	Information		Location Information
Analyst	TL	Roadway	Westlake Terrace
Agency or Company	ATCS	Intersection	At Motor City Drive
Date Performed	12/07/21	Jurisdiction	City of Rockville
-		Analysis Year	2045
· ·	ut Data	Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)			4SG
AADT _{major} (veh/day)	$AADT_{MAX} = 67,700 (veh/day)$		17,239
AADT _{minor} (veh/day)	$AADT_{MAX} = 33,400 (veh/day)$		4,831
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C _i		1.00	1.00
Data for unsignalized intersections only:			
Number of major-road approaches with left-	turn lanes (0,1,2)	0	0
Number of major-road approaches with righ	t-turn lanes (0,1,2)	0	0
Data for signalized intersections only:			
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	4
Number of approaches with right-turn lanes	(0,1,2,3,4) [for 3SG, use maximum value of 3]	0	0
Number of approaches with left-turn signal	phasing [for 3SG, use maximum value of 3]		1
Type of left-turn signal phasing for Leg #1		Permissive	Permissive
Type of left-turn signal phasing for Leg #2			Permissive / Protected
Type of left-turn signal phasing for Leg #3			Permissive
Type of left-turn signal phasing for Leg #4 (i	f applicable)		Permissive
Number of approaches with right-turn-on-re	d prohibited [for 3SG, use maximum value of 3]	0	0
Intersection red light cameras (present/not present/not	Not Present	Not Present	
Sum of all pedestrian crossing volumes (Pe	edVol) Signalized intersections only		54
Maximum number of lanes crossed by a pe	destrian (n _{lanesx})		5
Number of bus stops within 300 m (1,000 ft		0	2
Schools within 300 m (1,000 ft) of the inters	\(\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	Not Present	Not Present
Number of alcohol sales establishments wit	hin 300 m (1,000 ft) of the intersection	0	0

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections							
(1)	(2)	(3)	(4)	(5)	(6)	(7)		
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF		
	Phasing							
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}		
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)		
0.66	1.00	1.00	1.00	0.91	1.00	0.60		

	Worksheet 2C Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections											
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Crash Severity Level	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
-				Parameter, k	Initial N _{bimv}	Crashes	N _{bimv}	CMFs	Factor, C _i	N_{bimv}		
	fr	om Table 12-1	0	from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)		
	а	b	С	IIOIII Table 12-10	21	(T)TOTAL (S)		Worksheet 2B		(0) (1) (0)		
Total	-10.99	1.07	0.23	0.39	4.050	1.000	4.050	0.60	1.00	2.435		
Fotal and Injury (FI)	-13.14	1.18	0.22	0.33	1.267	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	1.318	0.60	1.00	0.792		
Fatal and Injury (FI)	-13.14	1.10	0.22	0.33	1.207	0.325	1.310	0.60	1.00	0.792		
Property Damage Only	44.00	4.00	0.04	0.44	0.007	(5) _{TOTAL} -(5) _{FI}	0.700	0.00	4.00	4.040		
(PDO)	-11.02	1.02	0.24	0.44	2.627	0.675	2.732	0.60	1.00	1.642		

	Worksheet 2D Multiple-	Vehicle Collisions by Collis	sion Type for Urban and Suburb	an Arterial Intersections		
(1)	(2)	(3)	(4)	(5)	(6)	
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bimv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv (TOTAL)} (crashes/year)	
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C	
Total	1.000	0.792	1.000	1.642	2.435	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Rear-end collision	0.450	0.357	0.483	0.793	1.150	
Head-on collision	0.049	0.039	0.030	0.049	0.088	
Angle collision	0.347	0.275	0.244	0.401	0.676	
Sideswipe	0.099	0.078	0.032	0.053	0.131	
Other multiple-vehicle collision	0.055	0.044	0.211	0.347	0.390	

		Worksheet	2E Single-\	ehicle Collisions by Severi	ty Level for Urban	and Suburban Arterial In	tersections			
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
			Parameter, k	Initial N _{bisv} Crashes		N_{bimv}	CMFs	Factor, C _i	N_{bisv}	
Crash Severity Level	fr	om Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from	Ī	(6)*(7)*(8)
	а	b	С	from Table 12-12	(FI) from Eqn. 12-		(T)TOTAL (U)	Worksheet 2B		(0) (1) (0)
	а	D	C		24 or 12-27					
Total	-10.21	0.68	0.27	0.36	0.276	1.000	0.276	0.60	1.00	0.166
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.075	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.075	0.60	1.00	0.045
ratai and injury (FI)	-9.25	0.43	0.29	0.09	0.075	0.272	0.075	0.60	1.00	0.045
Property Damage Only	44.04	0.70	0.05	0.44	0.000	(5) _{TOTAL} -(5) _{FI}	0.004	0.00	1.00	0.404
(PDO)	-11.34	0.78	0.25	0.44	0.200	0.728	0.201	0.60		0.121

	Worksheet 2F Single-V	ehicle Collisions by Collis	ion Type for Urban and Suburba	n Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(F1)	Predicted N _{bisv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv} (TOTAL) (crashes/year)
	from Table 12-13	(9)FI from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.045	1.000	0.121	0.166
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.000	0.000
Collision with fixed object	0.744	0.034	0.870	0.105	0.139
Collision with other object	0.072	0.003	0.070	0.008	0.012
Other single-vehicle collision	0.040	0.002	0.023	0.003	0.005
Single-vehicle noncollision	0.141	0.006	0.034	0.004	0.010

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(1) (2) (3) (4) (5)								
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}				
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total									
Fatal and injury (FI)				-					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections								
(1)	(2)	(3)	(4)						
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF						
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CiviF						
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)						
2.78	1.00	1.00	2.78						

Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections											
(1)	(2)					(3)	(4)	(5)	(6)	(7)	
Crash Severity Level	SPF Coefficients					Overdispersion	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}	
Crash Seventy Level		fı	om Table 12-1	14		Parameter, k	from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)	
	а	b	С	d	е		Hom Equation 12-29	(4) HOIH WORKSHEEL ZIT		(4) (3) (0)	
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.021	2.78	1.00	0.058	
Fatal and Injury (FI)							1		1.00	0.058	

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections									
(1)	(2)	(7)*							
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}				
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)				
Total	2.435	0.166	2.601	0.015	0.039				
Fatal and injury (FI)		-			0.039				

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

(1)	(2)	(3)	(4)
· · · · · · · · · · · · · · · · · · ·	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE		• •
Rear-end collisions (from Worksheet 2D)	0.357	0.793	1.150
Head-on collisions (from Worksheet 2D)	0.039	0.049	0.088
Angle collisions (from Worksheet 2D)	0.275	0.401	0.676
Sideswipe (from Worksheet 2D)	0.078	0.053	0.131
Other multiple-vehicle collision (from Worksheet 2D)	0.044	0.347	0.390
Subtotal	0.792	1.642	2.435
	SINGLE-VEHICLE		
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 2F)	0.034	0.105	0.139
Collision with other object (from Worksheet 2F)	0.003	0.008	0.012
Other single-vehicle collision (from Worksheet 2F)	0.002	0.003	0.005
Single-vehicle noncollision (from Worksheet 2F)	0.006	0.004	0.010
Collision with pedestrian (from Worksheet 2G or 2I)	0.058	0.000	0.058
Collision with bicycle (from Worksheet 2J)	0.039	0.000	0.039
Subtotal	0.142	0.121	0.263
Fotal Control	0.935	1.763	2.698

Worksheet 2L Summary Results for Urban and Suburban Arterial Intersections							
(1)	(2)						
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)						
	(Total) from Worksheet 2K						
Total	2.7						
Fatal and injury (FI)	0.9						
Property damage only (PDO)	1.8						

Worksheet	1A General Ir	nformation	and Input Da	ata for Urban and Suburbar	n Roadway	Segments
General Information			-			Location Information
Analyst		TL		Roadway		Westlake Terrace
Agency or Company		ATCS		Roadway Section		Motor City Dr to I-270 Spur Ramps
Date Performed		12/07/21		Jurisdiction		City of Rockville
				Analysis Year		2045
Input Data	•			Base Conditions		Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)						4D
Length of segment, L (mi)						0.03
AADT (veh/day)	$AADT_{MAX} =$	66,000	(veh/day)			17,206
Type of on-street parking (none/parallel/angle)				None		None
Proportion of curb length with on-street parking						0
Median width (ft) - for divided only				15		15
Lighting (present / not present)				Not Present		Present
Auto speed enforcement (present / not present)				Not Present		Not Present
Major commercial driveways (number)						0
Minor commercial driveways (number)						0
Major industrial / institutional driveways (number)						0
Minor industrial / institutional driveways (number)						0
Major residential driveways (number)						0
Minor residential driveways (number)						0
Other driveways (number)						0
Speed Category						Posted Speed 30 mph or Lower
Roadside fixed object density (fixed objects / mi)				0		67
Offset to roadside fixed objects (ft) [If greater than 30 or Not Pro	esent, input 30]			30		12
Calibration Factor, Cr				1.00		1.00

	Worksheet 1B Crash Modification Factors for Urban and Suburban Roadway Segments									
(1)	(2)	(6)								
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF					
CMF 1r	CMF 2r	CMF 3r	CMF 4r	CMF 5r	CMF comb					
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)					
1.00	1.15	1.00	0.91	1.00	1.05					

			le-Vehicle Nondriveway Co	ollisions by Severity Level	tor Urban and Suburba		egments		1 (2)
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	SPF Coefficients from Table 12-3		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
•			Parameter, k from Table 12-3	Initial N _{brmv} from Equation 12-10	Crashes	(4) _{TOTAL} *(5)	CMFs (6) from	Factor, Cr	N _{brmv} (6)*(7)*(8)
	а	b		nom Equation 12 10		(')IOIAL (')	Worksheet 1B		(0) (.) (0)
Total	-12.34	1.36	1.32	0.076	1.000	0.076	1.05	1.00	0.079
Fatal and Injury (FI)	-12.76	1.28	1.31	0.023	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.021	1.05	1.00	0.023
					0.284				
Property Damage Only (PDO)	-12.81	1.38	1.34	0.057	(5) _{TOTAL} -(5) _{FI}	0.054	1.05	1.00	0.057
					0.716	0.004	1.00	1.50	0.007

VVO	orksheet 1D Multiple-Vehicle No	ndriveway Collisions by	Collision Type for Urban ar	d Suburban Roadway Se	<u> </u>	
(1)	(2)	(2) (3) (4)		(5)	(6)	
Collision Type	Proportion of Collision	Predicted N brmv (FI)	Proportion of Collision	Predicted N brmv (PDO)	Predicted N _{brmv (TOTAL)} (crashes/year)	
	Туре(ғі)	(crashes/year)	Type _(PDO)	(crashes/year)	Tredicted iv brmv (TOTAL) (Crashes/year)	
	from Table 12-4	(9) _{FI} from Worksheet 1C	from Table 12-4	(9)PDO from Worksheet	(9)TOTAL from Worksheet 1C	
	IIOIII Table 12-4	(9)FI HOITI WORKSHEEL TO	IIOIII Table 12-4	from Table 12-4 1C (9)TOTAL from Worksr		
Total	1.000	0.023	1.000	0.057	0.079	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Rear-end collision	0.832	0.019	0.662	0.038	0.056	
Head-on collision	0.020	0.000	0.007	0.000	0.001	
Angle collision	0.040	0.001	0.036	0.002	0.003	
Sideswipe, same direction	0.050	0.001	0.223	0.013	0.014	
Sideswipe, opposite direction	0.010	0.000	0.001	0.000	0.000	
Other multiple-vehicle collision	0.048	0.001	0.071	0.004	0.005	

	W	orksheet 1E -	- Single-Vehicle Collisions I	by Severity Level for Urba	an and Suburban Road	way Segments	3			
(1)	(:	2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
Crash Severity Level			Parameter, k	Initial N _{brsv}	Crashes	N _{brsv}	CMFs	Factor, Cr	N _{brsv}	
	from Table 12-5		from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)	
	а	b	Holli Table 12-3	IIOIII Equation 12-13		(+)TOTAL (3)	Worksheet 1B		(0) (1) (0)	
Total	-5.05	0.47	0.86	0.019	1.000	0.019	1.05	1.00	0.020	
Fatal and Injury (FI)	-8.71	0.66	0.28	0.003	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.003	1.05	1.00	0.003	
i atai and injury (i i)	-0.71	0.00	0.20	0.003	0.165	0.003	1.03	1.00	0.003	
Property Democra Only (PDO)	-5.04	0.45	1.06	0.046	(5) _{TOTAL} -(5) _{FI}	0.016	1.05	1.00	0.017	
Property Damage Only (PDO)	-5.04	0.45	1.00	0.016	0.835	0.016	1.05	1.00	0.017	

	Worksheet 1F Single-Vehi	cle Collisions by Collision	n Type for Urban and Subu	rban Roadway Segments		
(1)	(2)	(3)	(4)	(5)	(6)	
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{brsv} (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N brsv (PDO) (crashes/year)	Predicted N _{brsv (TOTAL)} (crashes/year) (9) _{TOTAL} from Worksheet 1E	
	from Table 12-6	(9) _{FI} from Worksheet 1E	from Table 12-6	(9)PDO from Worksheet 1E		
Total	1.000	0.003	1.000	0.017	0.020	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Collision with animal	0.001	0.000	0.063	0.001	0.001	
Collision with fixed object	0.500	0.002	0.813	0.013	0.015	
Collision with other object	0.028	0.000	0.016	0.000	0.000	
Other single-vehicle collision	0.471	0.002	0.108	0.002	0.003	

Work	sheet 1G Multiple-Vehicle Drive	way-Related Collisions by	y Driveway Type for Urban	and Suburban Roadway Segments	
(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	Number of driveways,	Crashes per driveway Coefficient for traffic		Initial N _{brdwy}	Overdispersion parameter, k
	n _i	from Table 12-7	from Table 12-7	Equation 12-16	from Table 12-7
	•	ITOTTI TADIE 12-7	ITOTTI TABLE 12-7	n _j * N _j * (AADT/15,000) ^t	IIOIII Table 12-7
Major commercial	0	0.033	1.106	0.000	
Minor commercial	0	0.011	1.106	0.000	
Major industrial/institutional	0	0.036	1.106	0.000	
Minor industrial/institutional	0	0.005	1.106	0.000	
Major residential	0	0.018	1.106	0.000	
Minor residential	0	0.003	1.106	0.000	
Other	0	0.005	1.106	0.000	
Total				0.000	1.39

Worksheet 1H Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(7)		
Crash Severity Level	Initial N _{brdwy}	Proportion of total crashes (f _{dwy})	Adjusted N _{brdwy}	Combined CMFs	Calibration factor, C,	Predicted N _{brdwy}		
	(5) _{TOTAL} from Worksheet 1G	from Table 12-7	(2) _{TOTAL} * (3)	(6) from Worksheet 1B	, ,	(4)*(5)*(6)		
Total	0.000	1.000	0.000	1.05	1.00	0.000		
Fatal and injury (FI)		0.284	0.000	1.05	1.00	0.000		
Property damage only (PDO)		0.716	0.000	1.05	1.00	0.000		

	Worksheet 1I Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(8)*			
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{pedr}	Predicted N _{pedr}			
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8	(5)*(6)			
Total	0.079	0.020	0.000	0.099	0.067	0.007			
Fatal and injury (FI)						0.007			

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-19

	Worksheet 1J Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(8)*			
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{biker}	Predicted N _{biker}			
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9	(5)*(6)			
Total	0.079	0.020	0.000	0.099	0.013	0.001			
Fatal and injury (FI)						0.001			

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-20

(1)	et 1K Crash Severity Distribution for Urban a	(3)	(4)
(1)	Fatal and injury (FI)	Property damage only (PDO)	Total
	(3) from Worksheet 1D and 1F;	(5) from Worksheet 1D and 1F; and	(6) from Worksheet 1D and 1F;
Collision type	(7) from Worksheet 1H; and	(7) from Worksheet 1H	(7) from Worksheet 1H; and
	(8) from Worksheet 1I and 1J	(,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	(8) from Worksheet 1I and 1J
	MULTIPLE-VEHICLE		11.7
Rear-end collisions (from Worksheet 1D)	0.019	0.038	0.056
Head-on collisions (from Worksheet 1D)	0.000	0.000	0.001
Angle collisions (from Worksheet 1D)	0.001	0.002	0.003
Sideswipe, same direction (from Worksheet 1D)	0.001	0.013	0.014
Sideswipe, opposite direction (from Worksheet 1D)	0.000	0.000	0.000
Oriveway-related collisions (from Worksheet 1H)	0.000	0.000	0.000
Other multiple-vehicle collision (from Worksheet 1D)	0.001	0.004	0.005
Subtotal	0.023	0.057	0.079
	SINGLE-VEHICLE		•
Collision with animal (from Worksheet 1F)	0.000	0.001	0.001
Collision with fixed object (from Worksheet 1F)	0.002	0.013	0.015
Collision with other object (from Worksheet 1F)	0.000	0.000	0.000
Other single-vehicle collision (from Worksheet 1F)	0.002	0.002	0.003
Collision with pedestrian (from Worksheet 1I)	0.007	0.000	0.007
Collision with bicycle (from Worksheet 1J)	0.001	0.000	0.001
Subtotal	0.011	0.017	0.028
Total	0.034	0.073	0.107

V	Vorksheet 1L Summary Results for U	rban and Suburban Roadway Segmen	ts
(1)	(2)	(3)	(4)
Crash Severity Level	Predicted average crash frequency, N predicted rs (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)
	(Total) from Worksheet 1K		(2) / (3)
Total	0.1	0.03	3.6
Fatal and injury (FI)	0.0	0.03	1.1
Property damage only (PDO)	0.1	0.03	2.4

0	Worksheet 2A General Information and Input	Data for Orban and Suburban Arte	
	Information		Location Information
Analyst	TL	Roadway	Westlake Terrace
Agency or Company	ATCS	Intersection	At I-270 ML Ramp Terminal
Date Performed	12/07/21	Jurisdiction	City of Rockville
		Analysis Year	2045
	ut Data	Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)	AADT		4SG
AADT _{major} (veh/day)	$AADT_{MAX} = 67,700 (veh/day)$		24,349
AADT _{minor} (veh/day)	$AADT_{MAX} = 33,400 (veh/day)$		9,249
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C _i		1.00	1.00
Data for unsignalized intersections only:			-
Number of major-road approaches with left	-turn lanes (0,1,2)	0	0
Number of major-road approaches with right	er of major-road approaches with right-turn lanes (0,1,2)		0
Data for signalized intersections only:			
Number of approaches with left-turn lanes	(0,1,2,3,4) [for 3SG, use maximum value of 3]	0	2
Number of approaches with right-turn lanes	s (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	0
Number of approaches with left-turn signal	phasing [for 3SG, use maximum value of 3]		2
Type of left-turn signal phasing for Leg #1		Permissive	Protected
Type of left-turn signal phasing for Leg #2			Protected
Type of left-turn signal phasing for Leg #3			Permissive
Type of left-turn signal phasing for Leg #4 ((if applicable)		Permissive
Number of approaches with right-turn-on-re	ed prohibited [for 3SG, use maximum value of 3]	0	0
Intersection red light cameras (present/not		Not Present	Not Present
Sum of all pedestrian crossing volumes (P	edVol) Signalized intersections only		54
Maximum number of lanes crossed by a pe	edestrian (n _{lanesx})		5
Number of bus stops within 300 m (1,000 ft	t) of the intersection	0	3
Schools within 300 m (1,000 ft) of the inters	\(\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	Not Present	Not Present
Number of alcohol sales establishments wi	thin 300 m (1,000 ft) of the intersection	0	0

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections								
(1)	(2)	(3)	(4)	(5)	(6)	(7)			
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF			
	Phasing								
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}			
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)			
0.81	0.88	1.00	1.00	0.91	1.00	0.65			

	Worksheet 2C Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections										
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
Crash Severity Level	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
-		from Table 40.40		Parameter, k	Initial N _{bimv}	Crashes	N _{bimv}	CMFs	Factor, C _i	N_{bimv}	
	fr	om Table 12-1	0	from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from	1 7	(6)*(7)*(8)	
	а	b	С	IIOIII Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)	
Total	-10.99	1.07	0.23	0.39	6.805	1.000	6.805	0.65	1.00	4.436	
Fotal and Injuny (FI)	-13.14	1.18	0.22	0.33	2.198	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	2.278	0.65	1.00	1.485	
Fatal and Injury (FI)	-13.14	1.10	0.22	0.33	2.190	0.335	2.210	0.05	1.00	1.400	
Property Damage Only	-11.02	1.02	0.24	0.44	4.367	(5) _{TOTAL} -(5) _{FI}	4.527	0.65	1.00	2.951	
(PDO)	11.02	1.02	U.Z-4	0.44	1.507	0.665	1.527	3.00	1.00	2.501	

	Worksheet 2D Multiple-	Vehicle Collisions by Collis	sion Type for Urban and Suburb	an Arterial Intersections		
(1)	(2)	(2) (3) (4) (5)		(5)	(6)	
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bimv} (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv (TOTAL)} (crashes/year)	
	from Table 12-11	(9) _{FI} from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C	
Total	1.000	1.485	1.000	2.951	4.436	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Rear-end collision	0.450	0.668	0.483	1.425	2.093	
Head-on collision	0.049	0.073	0.030	0.089	0.161	
Angle collision	0.347	0.515	0.244	0.720	1.235	
Sideswipe	0.099	0.147	0.032	0.094	0.241	
Other multiple-vehicle collision	0.055	0.082	0.211	0.623	0.704	

		Worksheet	2E Single-\	ehicle Collisions by Severi	ity Level for Urban	and Suburban Arterial In	tersections			
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	
	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
				Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}
Crash Severity Level	fr	om Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from	Ī	(6)*(7)*(8)
	а	b	С	from Table 12-12	(FI) from Eqn. 12-		(T)TOTAL (U)	Worksheet 2B		(0) (1) (0)
	а	b	C		24 or 12-27					
Total	-10.21	0.68	0.27	0.36	0.416	1.000	0.416	0.65	1.00	0.271
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.105	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.106	0.65	1.00	0.069
ratarand injury (FI)	-9.25	0.43	0.29	0.09	0.105	0.254	0.100	0.05	1.00	0.069
Property Damage Only	44.04	0.70	0.05	0.44	0.000	(5) _{TOTAL} -(5) _{FI}	0.044	0.05	4.00	0.000
(PDO)	-11.34	0.78	0.25	0.44	0.308	0.746	0.311	0.65	1.00	0.203

(1)	(2)	(3)	ion Type for Urban and Suburba	(5)	(6)
Collision Type	Proportion of Collision Type(FI)	Predicted N _{bisv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv (TOTAL)} (crashes/year)
	from Table 12-13	(9) _{FI} from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.069	1.000	0.203	0.271
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.000	0.001
Collision with fixed object	0.744	0.051	0.870	0.176	0.227
Collision with other object	0.072	0.005	0.070	0.014	0.019
Other single-vehicle collision	0.040	0.003	0.023	0.005	0.007
Single-vehicle noncollision	0.141	0.010	0.034	0.007	0.017

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(2)	(3)	(4)	(5)	(7)*				
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}				
Crash Severity Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total				-					
Fatal and injury (FI)				-					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections								
(1)	(2)	(3)	(4)						
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF						
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CMF						
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)						
4.15	1.00	1.00	4.15						

		Workshe	et 2I Vehicle	e-Pedestrian C	collisions for l	Jrban and Suburba	n Arterial Signalized Inte	rsections		
(1)		(2)				(3)	(4)	(5)	(6)	(7)
Crash Severity Level		S	SPF Coefficien	ts		Overdispersion	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}
Crash Severity Level		f	rom Table 12-1	14		Parameter, k	from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)
	а	b	С	d	е		IIOIII Equation 12-29	(4) HOIH WORKSHEEL ZIT		(4) (3) (0)
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.027	4.15	1.00	0.111
Fatal and Injury (FI)									1.00	0.111

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections								
(1)	(2)	(3)	(4)	(5)	(7)*			
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}			
Clash Severity Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)			
Total	4.436	0.271	4.707	0.015	0.071			
Fatal and injury (FI)		-			0.071			

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksh	eet 2K Crash Severity Distribution for Urban a	nd Suburban Arterial Intersections	
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE		
Rear-end collisions (from Worksheet 2D)	0.668	1.425	2.093
Head-on collisions (from Worksheet 2D)	0.073	0.089	0.161
Angle collisions (from Worksheet 2D)	0.515	0.720	1.235
Sideswipe (from Worksheet 2D)	0.147	0.094	0.241
Other multiple-vehicle collision (from Worksheet 2D)	0.082	0.623	0.704
Subtotal	1.485	2.951	4.436
	SINGLE-VEHICLE		
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.001
Collision with fixed object (from Worksheet 2F)	0.051	0.176	0.227
Collision with other object (from Worksheet 2F)	0.005	0.014	0.019
Other single-vehicle collision (from Worksheet 2F)	0.003	0.005	0.007
Single-vehicle noncollision (from Worksheet 2F)	0.010	0.007	0.017
Collision with pedestrian (from Worksheet 2G or 2I)	0.111	0.000	0.111
Collision with bicycle (from Worksheet 2J)	0.071	0.000	0.071
Subtotal	0.251	0.203	0.453
Total	1.736	3.153	4.889

Worksheet 2L Summary Resul	ts for Urban and Suburban Arterial Intersections
(1)	(2)
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)
	(Total) from Worksheet 2K
Total	4.9
Fatal and injury (FI)	1.7
Property damage only (PDO)	3.2

Worksheet	1A General Ir	nformation	and Input Da	ata for Urban and Suburbar	n Roadway	Segments
General Information			-			Location Information
Analyst		TL		Roadway		Westlake Terrace
Agency or Company		ATCS		Roadway Section		I-270 Spur Ramps to Rockledge Dr
Date Performed		12/07/21		Jurisdiction		City of Rockville
		Analysis Year			2045	
Input Data	•			Base Conditions		Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)						4D
Length of segment, L (mi)						0.05
AADT (veh/day)	$AADT_{MAX} =$	66,000	(veh/day)			19,210
Type of on-street parking (none/parallel/angle)				None		None
Proportion of curb length with on-street parking						0
Median width (ft) - for divided only				15		15
Lighting (present / not present)				Not Present		Present
Auto speed enforcement (present / not present)				Not Present		Not Present
Major commercial driveways (number)						0
Minor commercial driveways (number)						0
Major industrial / institutional driveways (number)						0
Minor industrial / institutional driveways (number)						0
Major residential driveways (number)						0
Minor residential driveways (number)						0
Other driveways (number)						0
Speed Category	•	•				Posted Speed 30 mph or Lower
Roadside fixed object density (fixed objects / mi)				0		40
Offset to roadside fixed objects (ft) [If greater than 30 or Not Pro	esent, input 30]			30		12
Calibration Factor, Cr				1.00		1.00

	Worksheet 1B Crash Modification Factors for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)					
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF					
CMF 1r	CMF 2r	CMF 3r	CMF 4r	CMF 5r	CMF comb					
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)					
1.00	1.08	1.00	0.91	1.00	0.98					

(4)			e-Vehicle Nondriveway Co	onisions by Severity Level	TOT UTDAII AND SUDURDA		egments	(0)	(0)		
Crash Severity Level	(2) SPF Coefficients		\ /				(১) Proportion of Total Crashes	(6) Adjusted N _{brmv}	Combined CMFs	(8) Calibration Factor, Cr	(9) Predicted N _{brmv}
	from Ta a	ble 12-3 b	from Table 12-3	from Equation 12-10		(4) _{TOTAL} *(5)	(6) from Worksheet 1B		(6)*(7)*(8)		
Total	-12.34	1.36	1.32	0.146	1.000	0.146	0.98	1.00	0.144		
Fatal and Injury (FI)	-12.76	1.28	1.31	0.044	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.282	0.041	0.98	1.00	0.041		
Property Damage Only (PDO)	-12.81	1.38	1.34	0.111	(5) _{TOTAL} -(5) _{FI} 0.718	0.105	0.98	1.00	0.103		

(1)	(2)	(3)	(4)	(5)	(6)	
Collision Type	Proportion of Collision Type _(FI)	Predicted N brmv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N brmv (PDO) (crashes/year)	Predicted N _{brmv (TOTAL)} (crashes/year	
	from Table 12-4	(9)FI from Worksheet 1C	from Table 12-4	(9)PDO from Worksheet 1C	(9)TOTAL from Worksheet 1C	
Total	1.000	0.041	1.000	0.103	0.144	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Rear-end collision	0.832	0.034	0.662	0.068	0.102	
Head-on collision	0.020	0.001	0.007	0.001	0.002	
Angle collision	0.040	0.002	0.036	0.004	0.005	
Sideswipe, same direction	0.050	0.002	0.223	0.023	0.025	
Sideswipe, opposite direction	0.010	0.000	0.001	0.000	0.001	
Other multiple-vehicle collision	0.048	0.002	0.071	0.007	0.009	

	W	orksheet 1E -	- Single-Vehicle Collisions I	by Severity Level for Urba	an and Suburban Road	way Segments	;		
(1)	(1) (2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
	SPF Coe	SPF Coefficients Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
Crash Severity Level			Parameter, k	Initial N _{brsv}	Crashes	N _{brsv}	CMFs	Factor, Cr	N _{brsv}
	from Table 12-5		from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)
	a	b	HOIII TABIC 12-0	Hom Equation 12-15		(T)TOTAL (O)	Worksheet 1B		(0) (1) (0)
Total	-5.05	0.47	0.86	0.033	1.000	0.033	0.98	1.00	0.032
Fatal and Injury (FI)	-8.71	0.66	0.28	0.006	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.006	0.98	1.00	0.005
ratarana injury (i i)	-0.71	0.00	0.20	0.000	0.168	0.000	0.50	1.00	0.005
Preparty Damage Only (PDO)	-5.04	0.45	1.06	0.027	(5) _{TOTAL} -(5) _{FI}	0.027	0.98	1.00	0.027
Property Damage Only (PDO)	-5.04	0.45	1.06	0.027	0.832	0.027	0.96	1.00	0.027

	Worksheet 1F Single-Vehic	cle Collisions by Collisior	n Type for Urban and Subu	rban Roadway Segments		
(1)	(2)	(3)	(4)	(5)	(6)	
	Proportion of Collision Type(FI)	Predicted N brsv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N _{brsv} (PDO) (crashes/year)	Predicted N _{brsv (TOTAL)} (crashes/year) (9) _{TOTAL} from Worksheet 1E	
Collision Type	from Table 12-6	(9)FI from Worksheet 1E	from Table 12-6	(9)PDO from Worksheet 1E		
Total	1.000	0.005	1.000	0.027	0.032	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Collision with animal	0.001	0.000	0.063	0.002	0.002	
Collision with fixed object	0.500	0.003	0.813	0.022	0.025	
Collision with other object	0.028	0.000	0.016	0.000	0.001	
Other single-vehicle collision	0.471	0.003	0.108	0.003	0.005	

Work	sheet 1G Multiple-Vehicle Drive	way-Related Collisions by	y Driveway Type for Urban	and Suburban Roadway Segments	
(1)	(2)	(3)	(4)	(5)	(6)
Driveryay Type	Number of driveways,	Crashes per driveway Coefficient for traffic per year, N _i adjustment, t		Initial N _{brdwy}	Overdispersion parameter, k
Driveway Type	n _j	from Table 12-7	from Table 12-7	Equation 12-16	from Table 12-7
	-	IIOIII Table 12-7		n _j * N _j * (AADT/15,000) ^t	IIOIII Table 12-7
Major commercial	0	0.033	1.106	0.000	
Minor commercial	0	0.011	1.106	0.000	
Major industrial/institutional	0	0.036	1.106	0.000	
Minor industrial/institutional	0	0.005	1.106	0.000	
Major residential	0	0.018	1.106	0.000	
Minor residential	0	0.003	1.106	0.000	
Other	0	0.005	1.106	0.000	
Total				0.000	1.39

Worksheet 1H Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(7)		
Crash Severity Level	Initial N _{brdwy}	Proportion of total crashes (f _{dwy})	Adjusted N _{brdwy}	Combined CMFs	Calibration factor, C,	Predicted N _{brdwy}		
	(5) _{TOTAL} from Worksheet 1G	from Table 12-7	(2) _{TOTAL} * (3)	(6) from Worksheet 1B		(4)*(5)*(6)		
Total	0.000	1.000	0.000	0.98	1.00	0.000		
Fatal and injury (FI)		0.284	0.000	0.98	1.00	0.000		
Property damage only (PDO)		0.716	0.000	0.98	1.00	0.000		

	Worksheet 1I Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(8)*			
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{pedr}	Predicted N _{pedr}			
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8	(5)*(6)			
Total	0.144	0.032	0.000	0.176	0.067	0.012			
Fatal and injury (FI)						0.012			

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-19

	Worksheet 1J Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(8)*			
Crash Severity Level	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{biker}	Predicted N _{biker}			
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9	(5)*(6)			
Total	0.144	0.032	0.000	0.176	0.013	0.002			
Fatal and injury (FI)						0.002			

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-20

(1)	(2)	(3)	(4)
· · ·	Fatal and injury (FI)	Property damage only (PDO)	Total
Callinian tuna	(3) from Worksheet 1D and 1F;	(5) from Worksheet 1D and 1F; and	(6) from Worksheet 1D and 1F;
Collision type	(7) from Worksheet 1H; and	(7) from Worksheet 1H	(7) from Worksheet 1H; and
	(8) from Worksheet 1I and 1J		(8) from Worksheet 1I and 1J
	MULTIPLE-VEHICLE	•	
Rear-end collisions (from Worksheet 1D)	0.034	0.068	0.102
Head-on collisions (from Worksheet 1D)	0.001	0.001	0.002
Angle collisions (from Worksheet 1D)	0.002	0.004	0.005
Sideswipe, same direction (from Worksheet 1D)	0.002	0.023	0.025
Sideswipe, opposite direction (from Worksheet 1D)	0.000	0.000	0.001
Oriveway-related collisions (from Worksheet 1H)	0.000	0.000	0.000
Other multiple-vehicle collision (from Worksheet 1D)	0.002	0.007	0.009
Subtotal	0.041	0.103	0.144
	SINGLE-VEHICLE		
Collision with animal (from Worksheet 1F)	0.000	0.002	0.002
Collision with fixed object (from Worksheet 1F)	0.003	0.022	0.025
Collision with other object (from Worksheet 1F)	0.000	0.000	0.001
Other single-vehicle collision (from Worksheet 1F)	0.003	0.003	0.005
Collision with pedestrian (from Worksheet 1I)	0.012	0.000	0.012
Collision with bicycle (from Worksheet 1J)	0.002	0.000	0.002
Subtotal	0.020	0.027	0.047
Total Total	0.060	0.130	0.190

Worksheet 1L Summary Results for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)						
Crash Severity Level	Predicted average crash frequency, N predicted rs (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)						
ial	(Total) from Worksheet 1K		(2) / (3)						
Total	0.2	0.05	3.8						
Fatal and injury (FI)	0.1	0.05	1.2						
Property damage only (PDO)	0.1	0.05	2.6						

	Worksheet 2A General Information and Input	Data for Orban and Suburban Ar	
	l Information		Location Information
Analyst	TL	Roadway	Westlake Terrace
Agency or Company	ATCS	Intersection	At Rockledge Drive
Date Performed	12/07/21	Jurisdiction	City of Rockville
		Analysis Year	2045
	out Data	Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)			4SG
AADT _{major} (veh/day)	$AADT_{MAX} = 67,700 (veh/day)$		18,699
AADT _{minor} (veh/day)	$AADT_{MAX} = 33,400 (veh/day)$		13,784
Intersection lighting (present/not present)		Not Present	Not Present
Calibration factor, C _i		1.00	1.00
Data for unsignalized intersections only:			
Number of major-road approaches with lef	t-turn lanes (0,1,2)	0	0
Number of major-road approaches with rig	ht-turn lanes (0,1,2)	0	0
Data for signalized intersections only:			-
Number of approaches with left-turn lanes	(0,1,2,3,4) [for 3SG, use maximum value of 3]	0	3
Number of approaches with right-turn lane	s (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	2
Number of approaches with left-turn signal	phasing [for 3SG, use maximum value of 3]		4
Type of left-turn signal phasing for Leg #1		Permissive	Permissive / Protected
Type of left-turn signal phasing for Leg #2			Permissive / Protected
Type of left-turn signal phasing for Leg #3			Protected
Type of left-turn signal phasing for Leg #4	(if applicable)		Protected
Number of approaches with right-turn-on-re-	ed prohibited [for 3SG, use maximum value of 3]	0	0
Intersection red light cameras (present/not		Not Present	Not Present
Sum of all pedestrian crossing volumes (F	PedVoI) Signalized intersections only		54
Maximum number of lanes crossed by a pe	edestrian (n _{lanesx})		5
Number of bus stops within 300 m (1,000 f	t) of the intersection	0	6
Schools within 300 m (1,000 ft) of the inter	\(\)	Not Present	Not Present
Number of alcohol sales establishments w	ithin 300 m (1,000 ft) of the intersection	0	0

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(6)	(7)				
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF				
	Phasing									
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}				
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)				
0.73	0.87	0.92	1.00	1.00	1.00	0.58				

		Worksheet :	2C Multiple-	Vehicle Collisions by Seven	rity Level for Urban	ı and Suburban Arterial lı	ntersections			
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
-	T 11 40 40			Parameter, k	Initial N _{bimv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bimv}
	from Table 12-10		from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from	1	(6)*/7)*/9)	
	а	b	С	IIOIII Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(6)*(7)*(8)
Total	-10.99	1.07	0.23	0.39	5.623	1.000	5.623	0.58	1.00	3.276
Fotal and Injuny (FI)	-13.14	1.18	0.22	0.33	1.757	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	1.820	0.58	1.00	1.061
Fatal and Injury (FI)	-13.14	1.10	0.22	0.33	1.757	0.324	1.020			1.061
Property Damage Only	44.00	4.00	0.04	0.44	0.074	(5) _{TOTAL} -(5) _{FI}	0.000	0.50	4.00	0.040
(PDO)	-11.02	1.02	0.24	0.44	3.671	0.676	3.803	0.58	1.00	2.216

	Worksheet 2D Multiple-	Vehicle Collisions by Collis	sion Type for Urban and Suburb	an Arterial Intersections		
(1)	(2)	(3)	(4)	(5)	(6)	
Collision Type	Proportion of Collision Type _(FI)	Predicted N bimv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv (TOTAL)} (crashes/year)	
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C	
Total	1.000	1.061	1.000	2.216	3.276	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Rear-end collision	0.450	0.477	0.483	1.070	1.548	
Head-on collision	0.049	0.052	0.030	0.066	0.118	
Angle collision	0.347	0.368	0.244	0.541	0.909	
Sideswipe	0.099	0.105	0.032	0.071	0.176	
Other multiple-vehicle collision	0.055	0.058	0.211	0.468	0.526	

		Worksheet	2E Single-\	ehicle Collisions by Severi	ity Level for Urban	and Suburban Arterial In	tersections			
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
			Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
			Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}	
Crash Severity Level	fr	from Table 12-12			from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from	Ī	(6)*(7)*(8)
	а	b	С	from Table 12-12	(FI) from Eqn. 12-		(T)TOTAL (U)	Worksheet 2B		(0) (1) (0)
	а	b	C	24 (24 or 12-27					
Total	-10.21	0.68	0.27	0.36	0.388	1.000	0.388	0.58	1.00	0.226
Fotal and Injury (FI)	-9.25	0.43	0.29	0.09	0.105	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.106	0.58	1.00	0.062
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.105	0.275	0.100	0.56	1.00	0.062
Property Damage Only	44.04	0.70	0.05	0.44	0.077	(5) _{TOTAL} -(5) _{FI}	0.004	0.50	4.00	0.404
(PDO)	-11.34	0.78	0.25	0.44	0.277	0.725	0.281	0.58	1.00	0.164

	Worksheet 2F Single-V	ehicle Collisions by Collis	ion Type for Urban and Suburba	n Arterial Intersections		
(1)	(2)	(3)	(4)	(5)	(6)	
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bisv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv (TOTAL)} (crashes/year)	
	from Table 12-13	(9) _{FI} from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E	
Total	1.000	0.062	1.000	0.164	0.226	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000	
Collision with animal	0.002	0.000	0.002	0.000	0.000	
Collision with fixed object	0.744	0.046	0.870	0.142	0.189	
Collision with other object	0.072	0.004	0.070	0.011	0.016	
Other single-vehicle collision	0.040	0.002	0.023	0.004	0.006	
Single-vehicle noncollision	0.141	0.009	0.034	0.006	0.014	

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(2)	(3)	(4)	(5)	(7)*				
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}				
Crash Severity Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total				-					
Fatal and injury (FI)				-					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections							
(1)	(2)	(3)	(4)					
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF					
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CiviF					
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)					
4.15	1.00	1.00	4.15					

Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections										
(1)		(2)				(3)	(4)	(5)	(6)	(7)
Crash Severity Level	SPF Coefficients					Overdispersion Parameter, k	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}
Crash Seventy Level		from Table 12-14					from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)
	а	b	С	d	е		ITOTT Equation 12-23	(4) Holli Worksheet 211		(4) (3) (0)
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.031	4.15	1.00	0.131
Fatal and Injury (FI)									1.00	0.131

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(7)*				
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}				
Crash Severity Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)				
Total	3.276	0.226	3.502	0.015	0.053				
Fatal and injury (FI)				-	0.053				

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksh	eet 2K Crash Severity Distribution for Urban a	na Suburban Arterial Intersections	
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE	·	• • •
Rear-end collisions (from Worksheet 2D)	0.477	1.070	1.548
Head-on collisions (from Worksheet 2D)	0.052	0.066	0.118
Angle collisions (from Worksheet 2D)	0.368	0.541	0.909
Sideswipe (from Worksheet 2D)	0.105	0.071	0.176
Other multiple-vehicle collision (from Worksheet 2D)	0.058	0.468	0.526
Subtotal	1.061	2.216	3.276
	SINGLE-VEHICLE	·	
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 2F)	0.046	0.142	0.189
Collision with other object (from Worksheet 2F)	0.004	0.011	0.016
Other single-vehicle collision (from Worksheet 2F)	0.002	0.004	0.006
Single-vehicle noncollision (from Worksheet 2F)	0.009	0.006	0.014
Collision with pedestrian (from Worksheet 2G or 2I)	0.131	0.000	0.131
Collision with bicycle (from Worksheet 2J)	0.053	0.000	0.053
Subtotal	0.245	0.164	0.409
Total	1.306	2.380	3.685

Worksheet 2L Summary Resu	Its for Urban and Suburban Arterial Intersections
(1)	(2)
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)
	(Total) from Worksheet 2K
Total	3.7
Fatal and injury (FI)	1.3
Property damage only (PDO)	2.4

Works	heet 2A General Information and Input	t Data for Urban and Suburban A	rterial Intersecti	ons
General Informa	tion		Location	n Information
Analyst	TL	Roadway		Wootton Parkway
Agency or Company	ATCS	Intersection		At Seven Locks Road
Date Performed	12/07/21	Jurisdiction		Montgomery County
		Analysis Year		2045
Input Data		Base Conditions		Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)				4SG
AADT _{major} (veh/day)	$AADT_{MAX} = 67,700 (veh/day)$			23,494
AADT minor (veh/day)	$AADT_{MAX} = 33,400$ (veh/day)			18,991
Intersection lighting (present/not present)		Not Present		Present
Calibration factor, C _i		1.00		1.00
Data for unsignalized intersections only:				
Number of major-road approaches with left-turn land	es (0,1,2)	0		0
Number of major-road approaches with right-turn la	nes (0,1,2)	0		0
Data for signalized intersections only:				
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]	0		3
Number of approaches with right-turn lanes (0,1,2,3	,4) [for 3SG, use maximum value of 3]	0		3
Number of approaches with left-turn signal phasing	[for 3SG, use maximum value of 3]			3
Type of left-turn signal phasing for Leg #1		Permissive		Permissive
Type of left-turn signal phasing for Leg #2				Permissive / Protected
Type of left-turn signal phasing for Leg #3				Protected
Type of left-turn signal phasing for Leg #4 (if applica	ble)			Protected
Number of approaches with right-turn-on-red prohib	ited [for 3SG, use maximum value of 3]	0		0
Intersection red light cameras (present/not present)		Not Present		Not Present
Sum of all pedestrian crossing volumes (PedVol)	Signalized intersections only			122
Maximum number of lanes crossed by a pedestrian	(n _{lanesx})			6
Number of bus stops within 300 m (1,000 ft) of the in		0		2
Schools within 300 m (1,000 ft) of the intersection (p		Not Present		Not Present
Number of alcohol sales establishments within 300	m (1,000 ft) of the intersection	0		0

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(6)	(7)				
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF				
	Phasing									
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}				
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)				
0.73	0.87	0.88	1.00	0.91	1.00	0.51				

		Worksheet	2C Multiple-	Vehicle Collisions by Sever	rity Level for Urban	and Suburban Arterial I	ntersections			
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
-		from Table 12 10		Parameter, k	Initial N _{bimv}	Crashes	N _{bimv}	CMFs	Factor, C _i	N_{bimv}
	fr	om Table 12-1	0	from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from	Ī	(6)*(7)*(8)
	а	b	С	IIOIII Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)
Total	-10.99	1.07	0.23	0.39	7.728	1.000	7.728	0.51	1.00	3.976
Fotal and Injuny (FI)	-13.14	1.18	0.22	0.33	2.468	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	2 552	0.54	1.00	1.314
Fatal and Injury (FI)	-13.14	1.10	0.22	0.33	2.400	0.330	2.553 0.51	0.51	1.00	1.514
Property Damage Only	44.00	4.00	0.04	0.44	5.004	(5) _{TOTAL} -(5) _{FI}	F 470	0.54	4.00	0.000
(PDO)	-11.02	1.02	0.24	0.44	5.004	0.670	5.176	0.51	1.00	2.663

	Worksheet 2D Multiple-	Vehicle Collisions by Collis	sion Type for Urban and Suburb	an Arterial Intersections		
(1)	(2)	(3)	(4)	(5)	(6)	
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bimv} (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv} (TOTAL) (crashes/year)	
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C	
Total	1.000	1.314	1.000	2.663	3.976	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Rear-end collision	0.450	0.591	0.483	1.286	1.877	
Head-on collision	0.049	0.064	0.030	0.080	0.144	
Angle collision	0.347	0.456	0.244	0.650	1.106	
Sideswipe	0.099	0.130	0.032	0.085	0.215	
Other multiple-vehicle collision	0.055	0.072	0.211	0.562	0.634	

		Worksheet	2E Single-V	ehicle Collisions by Severi	ty Level for Urban	and Suburban Arterial In	tersections			
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
	SPF Coefficients		SPF Coefficients			Proportion of Total	Adjusted	Combined	Calibration	Predicted
				Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}
Crash Severity Level	fr	om Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from	Ī	(6)*(7)*(8)
		b	С	from Table 12-12	(FI) from Eqn. 12-		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)
	а	D	C		24 or 12-27					
Total	-10.21	0.68	0.27	0.36	0.494	1.000	0.494	0.51	1.00	0.254
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.127	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.129	0.51	1.00	0.066
Fatai and injury (Fi)	-9.25	0.43	0.29	0.09	0.127	0.261	0.129	0.51	1.00	0.000
Property Damage Only	44.24	0.70	0.25	0.44	0.250	(5) _{TOTAL} -(5) _{FI}	0.265	0.54	4.00	0.400
(PDO)	-11.34	0.78	0.25	0.44	0.358	0.739	0.365	0.51	1.00	0.188

	Worksheet 2F Single-V	ehicle Collisions by Collis	ion Type for Urban and Suburba	n Arterial Intersections		
(1)	(2)	(3)	(4)	(5)	(6)	
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bisv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv (TOTAL)} (crashes/year)	
	from Table 12-13	(9)FI from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E	
Total	1.000	0.066	1.000	0.188	0.254	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000	
Collision with animal	0.002	0.000	0.002	0.000	0.001	
Collision with fixed object	0.744	0.049	0.870	0.163	0.213	
Collision with other object	0.072	0.005	0.070	0.013	0.018	
Other single-vehicle collision	0.040	0.003	0.023	0.004	0.007	
Single-vehicle noncollision	0.141	0.009	0.034	0.006	0.016	

Worksheet	Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(2)	(3)	(4)	(5)	(7)*					
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}					
Crash Severity Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)					
Total				-						
Fatal and injury (FI)				-						

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections								
(1)	(2)	(3)	(4)						
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF						
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CiviF						
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)						
2.78	1.00	1.00	2.78						

		Workshe	et 2I Vehicle	e-Pedestrian C	ollisions for l	Jrban and Suburba	n Arterial Signalized Inte	rsections		
(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	SPF Coefficients				Overdispersion	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}	
Crash Severity Level		f	rom Table 12-1	14		Parameter, k	from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)
	а	b	С	d	е		IIOIII Equation 12-29	(4) HOIH WORKSHEEL ZIT		(4) (3) (0)
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.054	2.78	1.00	0.150
Fatal and Injury (FI)									1.00	0.150

V	Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(7)*					
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}					
Grash Severity Level	(9) from Worksheet 2C	Predicted N _{bisv} Predicted N _{bi} f _{bikei} (9) from Worksheet 2E (2) + (3) from Table 12-17 0.254 4.230 0.015	(4)*(5)							
Total	3.976	0.254	4.230	0.015	0.063					
Fatal and injury (FI)				-	0.063					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksh	neet 2K Crash Severity Distribution for Urban a	nd Suburban Arterial Intersections	
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE		•••
Rear-end collisions (from Worksheet 2D)	0.591	1.286	1.877
Head-on collisions (from Worksheet 2D)	0.064	0.080	0.144
Angle collisions (from Worksheet 2D)	0.456	0.650	1.106
Sideswipe (from Worksheet 2D)	0.130	0.085	0.215
Other multiple-vehicle collision (from Worksheet 2D)	0.072	0.562	0.634
Subtotal	1.314	2.663	3.976
	SINGLE-VEHICLE	·	
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.001
Collision with fixed object (from Worksheet 2F)	0.049	0.163	0.213
Collision with other object (from Worksheet 2F)	0.005	0.013	0.018
Other single-vehicle collision (from Worksheet 2F)	0.003	0.004	0.007
Single-vehicle noncollision (from Worksheet 2F)	0.009	0.006	0.016
Collision with pedestrian (from Worksheet 2G or 2I)	0.150	0.000	0.150
Collision with bicycle (from Worksheet 2J)	0.063	0.000	0.063
Subtotal	0.280	0.188	0.467
Total	1.593	2.850	4.444

Worksheet 2L Summary Resu	ılts for Urban and Suburban Arterial Intersections
(1)	(2)
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)
	(Total) from Worksheet 2K
Total	4.4
Fatal and injury (FI)	1.6
Property damage only (PDO)	2.9

		ii aiiu iliput D	ata for Urban and Suburba		· ·
General Information				L	Location Information
Analyst	TL		Roadway		Wootton Parkway
Agency or Company	ATCS		Roadway Section		Seven Locks Rd to I-270 ML Ramps
Date Performed	12/07/21		Jurisdiction		Montgomery County
			Analysis Year		2045
Input Data			Base Conditions		Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)					4D
Length of segment, L (mi)					0.11
AADT (veh/day)	$AADT_{MAX} = 66,000$	(veh/day)			21,156
Type of on-street parking (none/parallel/angle)			None		None
Proportion of curb length with on-street parking					0
Median width (ft) - for divided only			15		15
Lighting (present / not present)			Not Present		Present
Auto speed enforcement (present / not present)			Not Present		Not Present
Major commercial driveways (number)					0
Minor commercial driveways (number)					0
Major industrial / institutional driveways (number)					0
Minor industrial / institutional driveways (number)					0
Major residential driveways (number)					0
Minor residential driveways (number)		•			0
Other driveways (number)		•			0
Speed Category					Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		•	0		64
Offset to roadside fixed objects (ft) [If greater than 30 or Not Pr	esent, input 30]	•	30		9
Calibration Factor, Cr			1.00		1.00

	Worksheet 1B Crash Modification Factors for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)					
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF					
CMF 1r	CMF 2r	CMF 3r	CMF 4r	CMF 5r	CMF comb					
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)					
1.00	1.18	1.00	0.91	1.00	1.08					

(1)	Worksheet 1C Multip		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	SPF Coefficients		SPF Coefficients Overdispersion Parameter, k Initial N _{brmv}		Proportion of Total Crashes	Adjusted N _{brmv}	Combined CMFs	Calibration Factor, Cr	Predicted N _{brmv}
	from Ta a	ble 12-3 b	from Table 12-3	from Equation 12-10		(4) _{TOTAL} *(5)	(6) from Worksheet 1B		(6)*(7)*(8)
Total	-12.34	1.36	1.32	0.367	1.000	0.367	1.08	1.00	0.395
Fatal and Injury (FI)	-12.76	1.28	1.31	0.109	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.280	0.103	1.08	1.00	0.110
Property Damage Only (PDO)	-12.81	1.38	1.34	0.280	(5) _{TOTAL} -(5) _{FI} 0.720	0.264	1.08	1.00	0.284

Workshe	eet 1D Multiple-Vehicle No	ndriveway Collisions by	Collision Type for Urban an	id Suburban Roadway Se	egments	
(1)	(2)	(3)	(4)	(5)	(6)	
Collision Type	Proportion of Collision Type _(FI)	Predicted N brmv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N brmv (PDO) (crashes/year)	Predicted N _{brmv (TOTAL)} (crashes/year)	
	from Table 12-4	(9) _{FI} from Worksheet 1C	from Table 12-4	(9)PDO from Worksheet 1C	(9)TOTAL from Worksheet 1C	
Total	1.000	0.110	1.000	0.284	0.395	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Rear-end collision	0.832	0.092	0.662	0.188	0.280	
Head-on collision	0.020	0.002	0.007	0.002	0.004	
Angle collision	0.040	0.004	0.036	0.010	0.015	
Sideswipe, same direction	0.050	0.006	0.223	0.063	0.069	
Sideswipe, opposite direction	0.010	0.001	0.001	0.000	0.001	
Other multiple-vehicle collision	0.048	0.005	0.071	0.020	0.025	

	Worksheet 1E Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments										
(1)	(2)		(2) (3) (4) (5)		(6)	(7)	(8)	(9)			
	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
Crash Severity Level			Parameter, k	Initial N _{brsv}	Crashes	N _{brsv}	CMFs	Factor, Cr	N_{brsv}		
	from Table 12-5		from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)		
	a	b	Hom rable 12-3	Hom Equation 12-15		(4)TOTAL (0)	Worksheet 1B		(0) (1) (0)		
Total	-5.05	0.47	0.86	0.076	1.000	0.076	1.08	1.00	0.082		
Fatal and Injury (FI)	-8.71	0.66	0.28	0.013	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.013	1.08	1.00	0.014		
i atai and injury (i i)	-0.71	0.00	0.20	0.013	0.171	0.013	1.00	1.00	0.014		
Preparty Damage Only (PDO)	-5.04	0.45	1.06	0.063	(5) _{TOTAL} -(5) _{FI}	0.063	1.08	1.00	0.068		
Property Damage Only (PDO)	-5.04	0.45	1.00	0.003	0.829	0.003	1.00	1.00	0.000		

(1)	(2)	(3)	(4)	(5)	(6)	
Collision Type	Proportion of Collision Type _(FI)	Predicted N brsv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N brsv (PDO) (crashes/year)	Predicted N _{brsv (TOTAL)} (crashes/year	
	from Table 12-6	from Table 12-6 (9)FI from Worksheet 1E		(9)PDD from Worksheet 1E (9)TOTAL from Worksheet 1E		
Total	1.000	0.014	1.000	0.068	0.082	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Collision with animal	0.001	0.000	0.063	0.004	0.004	
Collision with fixed object	0.500	0.007	0.813	0.055	0.062	
Collision with other object	0.028	0.000	0.016	0.001	0.001	
Other single-vehicle collision	0.471	0.007	0.108	0.007	0.014	

Workshee	t 1G Multiple-Vehicle Drive	way-Related Collisions by	y Driveway Type for Urban	and Suburban Roadway Segments	
(1)	(2)	(3)	(4)	(5)	(6)
Drivougy Type	Number of driveways,	Crashes per driveway per year, N _j	Coefficient for traffic adjustment, t	Initial N _{brdwy}	Overdispersion parameter, k
Driveway Type	n _i	from Table 12-7	from Table 12-7	Equation 12-16	from Table 12-7
Acian commonais!	·	ITOTTI TADIE 12-7	ITOTTI TABLE 12-7	n _j * N _j * (AADT/15,000) ^t	ITOTTI Table 12-7
Major commercial	0	0.033	1.106	0.000	
Minor commercial	0	0.011	1.106	0.000	
Major industrial/institutional	0	0.036	1.106	0.000	
Minor industrial/institutional	0	0.005	1.106	0.000	
Major residential	0	0.018	1.106	0.000	
Minor residential	0	0.003	1.106	0.000	
Other	0	0.005	1.106	0.000	
Total				0.000	1.39

Worksheet	Worksheet 1H Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)	(7)				
Crash Severity Level	Initial N _{brdwy}	Proportion of total crashes (f _{dwy})	Adjusted N _{brdwy}	Combined CMFs	Calibration factor, C,	Predicted N _{brdwy}				
	(5) _{TOTAL} from Worksheet 1G			(6) from Worksheet 1B	, ,	(4)*(5)*(6)				
Total	0.000	1.000	0.000	1.08	1.00	0.000				
Fatal and injury (FI)		0.284	0.000	1.08	1.00	0.000				
Property damage only (PDO)		0.716	0.000	1.08	1.00	0.000				

	Worksheet 1I Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(8)*			
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{pedr}	Predicted N _{pedr}			
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8	(5)*(6)			
Total	0.395	0.082	0.000	0.477	0.019	0.009			
Fatal and injury (FI)						0.009			

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-19

	Worksheet 1J Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(8)*			
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{biker}	Predicted N _{biker}			
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9	(5)*(6)			
Total	0.395	0.082	0.000	0.477	0.005	0.002			
Fatal and injury (FI)						0.002			

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-20

(1)	et 1K Crash Severity Distribution for Urban (2)	(3)	(4)
(')	Fatal and injury (FI)	Property damage only (PDO)	Total
	(3) from Worksheet 1D and 1F;	(5) from Worksheet 1D and 1F; and	(6) from Worksheet 1D and 1F;
d-on collisions (from Worksheet 1D) e collisions (from Worksheet 1D) swipe, same direction (from Worksheet 1D) swipe, opposite direction (from Worksheet 1D) eway-related collisions (from Worksheet 1H) or multiple-vehicle collision (from Worksheet 1D) otal	(7) from Worksheet 1H; and	(7) from Worksheet 1H	(7) from Worksheet 1H; and
	(8) from Worksheet 1I and 1J	(,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	(8) from Worksheet 1I and 1J
	MULTIPLE-VEHICLE		(-,
Rear-end collisions (from Worksheet 1D)	0.092	0.188	0.280
Head-on collisions (from Worksheet 1D)	0.002	0.002	0.004
Angle collisions (from Worksheet 1D)	0.004	0.010	0.015
Sideswipe, same direction (from Worksheet 1D)	0.006	0.063	0.069
Sideswipe, opposite direction (from Worksheet 1D)	0.001	0.000	0.001
Oriveway-related collisions (from Worksheet 1H)	0.000	0.000	0.000
Other multiple-vehicle collision (from Worksheet 1D)	0.005	0.020	0.025
Subtotal	0.110	0.284	0.395
	SINGLE-VEHICLE	•	•
Collision with animal (from Worksheet 1F)	0.000	0.004	0.004
Collision with fixed object (from Worksheet 1F)	0.007	0.055	0.062
Collision with other object (from Worksheet 1F)	0.000	0.001	0.001
Other single-vehicle collision (from Worksheet 1F)	0.007	0.007	0.014
Collision with pedestrian (from Worksheet 1I)	0.009	0.000	0.009
Collision with bicycle (from Worksheet 1J)	0.002	0.000	0.002
Subtotal	0.025	0.068	0.093
Total	0.136	0.352	0.488

	Worksheet 1L Summary Results for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)							
Crash Severity Level	Predicted average crash frequency, N predicted rs (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)							
	(Total) from Worksheet 1K		(2) / (3)							
Total	0.5	0.11	4.4							
Fatal and injury (FI)	0.1	0.11	1.2							
Property damage only (PDO)	0.4	0.11	3.2							

	Worksheet 2A General Information and Input	Data for Orban and Suburban Arte	
	l Information		Location Information
Analyst	TL	Roadway	Wootton Parkway
Agency or Company	ATCS	Intersection	At I-270 ML Ramps
Date Performed	12/07/21	Jurisdiction	Montgomery County
		Analysis Year	2045
	put Data	Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)			4SG
AADT _{major} (veh/day)	$AADT_{MAX} = 67,700 (veh/day)$		27,315
AADT _{minor} (veh/day)	$AADT_{MAX} = 33,400 (veh/day)$	-	15,726
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C _i		1.00	1.00
Data for unsignalized intersections only:			
Number of major-road approaches with le	ft-turn lanes (0,1,2)	0	0
Number of major-road approaches with rig	ght-turn lanes (0,1,2)	0	0
Data for signalized intersections only:			
Number of approaches with left-turn lanes	(0,1,2,3,4) [for 3SG, use maximum value of 3]	0	4
Number of approaches with right-turn lane	es (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	2
Number of approaches with left-turn signa	l phasing [for 3SG, use maximum value of 3]		4
Type of left-turn signal phasing for Leg #1		Permissive	Protected
Type of left-turn signal phasing for Leg #2			Protected
Type of left-turn signal phasing for Leg #3			Protected
Type of left-turn signal phasing for Leg #4	(if applicable)		Protected
	red prohibited [for 3SG, use maximum value of 3]	0	0
Intersection red light cameras (present/no		Not Present	Not Present
Sum of all pedestrian crossing volumes (I	PedVol) Signalized intersections only		122
Maximum number of lanes crossed by a p	pedestrian (n _{lanesx})		5
Number of bus stops within 300 m (1,000	/	0	0
Schools within 300 m (1,000 ft) of the inte	\(\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	Not Present	Not Present
Number of alcohol sales establishments w	vithin 300 m (1,000 ft) of the intersection	0	0

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(6)	(7)				
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF				
	Phasing									
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}				
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)				
0.66	0.78	0.92	1.00	0.91	1.00	0.43				

	Worksheet 2C Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections									
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
		frame Table 40.40		Parameter, k	Initial N _{bimv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bimv}
	fr	om Table 12-1	0	from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from	(6)*(7)*(8)	
	а	b	С	IIOIII Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(0) (1) (0)
Total	-10.99	1.07	0.23	0.39	8.695	1.000	8.695	0.43	1.00	3.761
Fotal and Injury (FI)	-13.14	1.18	0.22	0.33	2.829	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	2.926	0.43	1.00	1.265
Fatal and Injury (FI)	-13.14	1.10	0.22	0.55	2.029	0.337	2.920	0.43	1.00	1.205
Property Damage Only	44.00	4.00	0.04	0.44		(5) _{TOTAL} -(5) _{FI}	5 700	0.40	4.00	0.405
(PDO)	-11.02	1.02	0.24	0.44	5.577	0.663	5.769	0.43	1.00	2.495

	Worksheet 2D Multiple-	Vehicle Collisions by Collis	sion Type for Urban and Suburb	an Arterial Intersections		
(1)	(2)	(3)	(4)	(5)	(6)	
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bimv} (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv (TOTAL)} (crashes/year) (9)PDO from Worksheet 2C	
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C		
Total	1.000	1.265	1.000	2.495	3.761	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Rear-end collision	0.450	0.569	0.483	1.205	1.775	
Head-on collision	0.049	0.062	0.030	0.075	0.137	
Angle collision	0.347	0.439	0.244	0.609	1.048	
Sideswipe	0.099	0.125	0.032	0.080	0.205	
Other multiple-vehicle collision	0.055	0.070	0.211	0.526	0.596	

		Worksheet	2E Single-\	ehicle Collisions by Severi	ity Level for Urban	and Suburban Arterial In	tersections			
(1)		(2)		(2) (3) (4)		(5)	(6)	(7)	(8)	(9)
	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted
			Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}	
Crash Severity Level	fr	om Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from	Ī	(6)*(7)*(8)
		a b c	from Table 12-12	(FI) from Eqn. 12-		(T)TOTAL (U)	Worksheet 2B		(0) (1) (0)	
	а	D	C		24 or 12-27					
Total	-10.21	0.68	0.27	0.36	0.520	1.000	0.520	0.43	1.00	0.225
Fotal and Injury (FI)	-9.25	0.43	0.29	0.09	0.128	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.130	0.43	1.00	0.056
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.120	0.250	0.130	0.43	1.00	0.056
Property Damage Only	44.04	0.70	0.05	0.44	0.004	(5) _{TOTAL} -(5) _{FI}	0.000	0.40	4.00	0.400
(PDO)	-11.34	0.78	0.25	0.44	0.384	0.750	0.390	0.43	1.00	0.169

	Worksheet 2F Single-V	ehicle Collisions by Collis	ion Type for Urban and Suburba	n Arterial Intersections		
(1)	(2)	(3)	(4)	(5)	(6)	
Collision Type	Proportion of Collision Type _(F1)	Predicted N _{bisv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv (TOTAL)} (crashes/year) (9)PDO from Worksheet 2E	
	from Table 12-13	(9)FI from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E		
Total	1.000	0.056	1.000	0.169	0.225	
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)	
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000	
Collision with animal	0.002	0.000	0.002	0.000	0.000	
Collision with fixed object	0.744	0.042	0.870	0.147	0.188	
Collision with other object	0.072	0.004	0.070	0.012	0.016	
Other single-vehicle collision	0.040	0.002	0.023	0.004	0.006	
Single-vehicle noncollision	0.141	0.008	0.034	0.006	0.014	

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections									
(1)	(2)	(3)	(4)	(5)	(7)*				
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}				
Clash Severity Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)				
Total									
Fatal and injury (FI)				-					

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections								
(1)	(1) (2) (3) (4)								
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF						
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CiviF						
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)						
1.00	1.00	1.00	1.00						

	Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections									
(1)		(2)				(3)	(4)	(5)	(6)	(7)
Crash Severity Level	SPF Coefficients			Overdispersion	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}		
Crash Seventy Level		from Table 12-14					from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)
	а	b	С	d	е	e Ioni Equation 12 25 (+) Ironi Volkonost 211			() () ()	
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.048	1.00	1.00	0.048
Fatal and Injury (FI)		-							1.00	0.048

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(7)*				
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}				
Crash Seventy Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)				
Total	3.761	0.225	3.985	0.015	0.060				
Fatal and injury (FI)					0.060				

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksr	neet 2K Crash Severity Distribution for Urban a	nd Suburban Arterial Intersections	
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
(1) Iision type Ir-end collisions (from Worksheet 2D) d-on collisions (from Worksheet 2D) le collisions (from Worksheet 2D) le collisions (from Worksheet 2D) er multiple-vehicle collision (from Worksheet 2D) total ision with parked vehicle (from Worksheet 2F) ision with animal (from Worksheet 2F) ision with fixed object (from Worksheet 2F) ision with other object (from Worksheet 2F) er single-vehicle collision (from Worksheet 2F) gle-vehicle noncollision (from Worksheet 2F) ision with pedestrian (from Worksheet 2F)	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE		• • •
Rear-end collisions (from Worksheet 2D)	0.569	1.205	1.775
Head-on collisions (from Worksheet 2D)	0.062	0.075	0.137
Angle collisions (from Worksheet 2D)	0.439	0.609	1.048
Sideswipe (from Worksheet 2D)	0.125	0.080	0.205
Other multiple-vehicle collision (from Worksheet 2D)	0.070	0.526	0.596
Subtotal	1.265	2.495	3.761
	SINGLE-VEHICLE		•
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 2F)	0.042	0.147	0.188
Collision with other object (from Worksheet 2F)	0.004	0.012	0.016
Other single-vehicle collision (from Worksheet 2F)	0.002	0.004	0.006
Single-vehicle noncollision (from Worksheet 2F)	0.008	0.006	0.014
Collision with pedestrian (from Worksheet 2G or 2I)	0.048	0.000	0.048
Collision with bicycle (from Worksheet 2J)	0.060	0.000	0.060
Subtotal	0.164	0.169	0.332
Total	1.429	2.664	4.093

Worksheet 2L Summary Results for Urban and Suburban Arterial Intersections							
(1)	(2)						
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)						
	(Total) from Worksheet 2K						
Total	4.1						
Fatal and injury (FI)	1.4						
Property damage only (PDO)	2.7						

Worksheet	1A General Information	n and Input D	ata for Urban and Suburba	n Roadway Se	egments
General Information		Lo	cation Information		
Analyst	TL	Roadway			Wootton Parkway
Agency or Company	ATCS		Roadway Section		I-270 ML Ramps to Tower Oaks Blvd
Date Performed	12/07/21		Jurisdiction		Montgomery County
			Analysis Year		2045
Input Data	•		Base Conditions		Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)					4D
Length of segment, L (mi)					0.12
AADT (veh/day)	$AADT_{MAX} = 66,000$	(veh/day)			33,475
Type of on-street parking (none/parallel/angle)			None		None
Proportion of curb length with on-street parking					0
Median width (ft) - for divided only			15		15
Lighting (present / not present)			Not Present		Present
Auto speed enforcement (present / not present)			Not Present		Not Present
Major commercial driveways (number)					1
Minor commercial driveways (number)					0
Major industrial / institutional driveways (number)					0
Minor industrial / institutional driveways (number)					0
Major residential driveways (number)					0
Minor residential driveways (number)					0
Other driveways (number)					0
Speed Category					Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)			0		67
Offset to roadside fixed objects (ft) [If greater than 30 or Not Pr	esent, input 30]		30		11
Calibration Factor, Cr			1.00		1.00

	Worksheet 1B Crash Modification Factors for Urban and Suburban Roadway Segments									
(1)	(2)	(3)	(4)	(5)	(6)					
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF					
CMF 1r	CMF 2r	CMF 3r	CMF 4r	CMF 5r	CMF comb					
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)					
1.00	1.16	1.00	0.91	1.00	1.06					

	Worksheet 1C Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments										
(1) (2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)			
Crash Severity Level	SPF Coe	efficients	Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
			Parameter, k	Initial N _{brmv}	Crashes	N _{brmv}	CMFs	Factor, Cr	N _{brmv}		
	from Ta	ble 12-3	from Table 12-3	from Equation 12-10		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)		
	а	b	IIOIII Table 12-3	nom Equation 12-10		(+)TOTAL (3)	Worksheet 1B	(0) (1) (0)			
Total	-12.34	1.36	1.32	0.747	1.000	0.747	1.06	1.00	0.793		
Fatal and Injury (FI)	-12.76	1.28	1.31	0.213	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.202	1.06	1.00	0.215		
. a.a. aajay ()	.2 0	0		0.2.0	0.271	0.202			0.2.10		
Property Damage Only (PDO)	-12.81	1.38	1.34	0.575	(5) _{TOTAL} -(5) _{FI}	0.545	1.06	1.00	0.579		
- Toperty Damage Only (FDO)	-12.01	1.30	1.04	0.073	0.729	0.545	1.00	1.00	0.579		

Wor	rksheet 1D Multiple-Vehicle No	ndriveway Collisions by	Collision Type for Urban ar	id Suburban Roadway Se	gments
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N brmv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N brmv (PDO) (crashes/year)	Predicted N _{brmv (TOTAL)} (crashes/year)
	from Table 12-4	(9) _{FI} from Worksheet 1C	from Table 12-4	(9)PDO from Worksheet 1C	(9)TOTAL from Worksheet 1C
Total	1.000	0.215	1.000	0.579	0.793
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.832	0.179	0.662	0.383	0.562
Head-on collision	0.020	0.004	0.007	0.004	0.008
Angle collision	0.040	0.009	0.036	0.021	0.029
Sideswipe, same direction	0.050	0.011	0.223	0.129	0.140
Sideswipe, opposite direction	0.010	0.002	0.001	0.001	0.003
Other multiple-vehicle collision	0.048	0.010	0.071	0.041	0.051

	Worksheet 1E Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments										
(1)	(2	2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)		
	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted		
Crash Soverity Level			Parameter, k	Initial N _{brsv}	Initial N _{brsv} Crashes		CMFs	Factor, Cr	N_{brsv}		
	from Table 12-5		from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)	(6) from		(6)*(7)*(8)		
	a	b	HOIII TABIC 12-3	Hom Equation 12-15		(T)TOTAL (O)	Worksheet 1B		(0) (1) (0)		
Total	-5.05	0.47	0.86	0.103	1.000	0.103	1.06	1.00	0.109		
Eatal and Injury (EI)	Ω 71	0.66	0.28	0.019	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.019	1.06	1.00	0.020		
(1) (2) (3) SPF Coefficients Overdispersion Parameter, k from Table 12-5 from Table 12-5 a b from Table 12-5	0.019	0.185	0.019	1.00	1.00	0.020					
Dranarti Damara Only (DDO)	5.04	0.45	1.06	0.004	(5) _{TOTAL} -(5) _{FI}	0.084	4.00	4.00	0.089		
Property Damage Only (PDO)	-5.04	0.45	1.06	0.084	0.815	0.084	1.06	1.00	0.089		

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N brsv (FI) (crashes/year)	Proportion of Collision Type _(PDO)	Predicted N brsv (PDO) (crashes/year)	Predicted N _{brsv (TOTAL)} (crashes/year)
,	from Table 12-6	(9)FI from Worksheet 1E	from Table 12-6	(9)PDO from Worksheet 1E	(9)TOTAL from Worksheet 1E
Total	1.000	0.020	1.000	0.089	0.109
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.001	0.000	0.063	0.006	0.006
Collision with fixed object	0.500	0.010	0.813	0.072	0.082
Collision with other object	0.028	0.001	0.016	0.001	0.002
Other single-vehicle collision	0.471	0.010	0.108	0.010	0.019

Work	sheet 1G Multiple-Vehicle Drive	way-Related Collisions by	y Driveway Type for Urban	and Suburban Roadway Segments	
(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	Number of driveways,	Crashes per driveway Coefficient for tra per year, N _i adjustment, t		Initial N _{brdwy}	Overdispersion parameter, k
	n _j	from Table 12-7	from Table 12-7	Equation 12-16	from Table 12-7
	-	Holli Table 12-7	HOIH Table 12-7	n _j * N _j * (AADT/15,000) ^t	IIOIII Table 12-7
Major commercial	1	0.033	1.106	0.080	
Minor commercial	0	0.011	1.106	0.000	
Major industrial/institutional	0	0.036	1.106	0.000	
Minor industrial/institutional	0	0.005	1.106	0.000	
Major residential	0	0.018	1.106	0.000	
Minor residential	0	0.003	1.106	0.000	
Other	0	0.005	1.106	0.000	
Total				0.080	1.39

Worksheet 1H Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(7)		
	Initial N _{brdwy}	Proportion of total crashes (f _{dwy})	Adjusted N _{brdwy}	Combined CMFs	Calibration factor, C,	Predicted N _{brdwy}		
	(5) _{TOTAL} from Worksheet 1G	from Table 12-7	(2) _{TOTAL} * (3)	(6) from Worksheet 1B	, ,	(4)*(5)*(6)		
Total	0.080	1.000	0.080	1.06	1.00	0.085		
Fatal and injury (FI)		0.284	0.023	1.06	1.00	0.024		
Property damage only (PDO)		0.716	0.057	1.06	1.00	0.061		

	Worksheet 1I Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(8)*			
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{pedr}	Predicted N _{pedr}			
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8	(5)*(6)			
Total	0.793	0.109	0.085	0.988	0.019	0.019			
Fatal and injury (FI)						0.019			

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-19

	Worksheet 1J Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments								
(1)	(2)	(3)	(4)	(5)	(6)	(8)*			
	Predicted N _{brmv}	Predicted N _{brsv}	Predicted N _{brdwy}	Predicted N _{br}	f _{biker}	Predicted N _{biker}			
Crash Severity Level	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9	(5)*(6)			
Total	0.793	0.109	0.085	0.988	0.005	0.005			
Fatal and injury (FI)						0.005			

^{*} Column 7 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-20

(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
N 111 - 1	(3) from Worksheet 1D and 1F;	(5) from Worksheet 1D and 1F; and	(6) from Worksheet 1D and 1F;
I-on collisions (from Worksheet 1D) e collisions (from Worksheet 1D) swipe, same direction (from Worksheet 1D) swipe, opposite direction (from Worksheet 1D) sway-related collisions (from Worksheet 1H) r multiple-vehicle collision (from Worksheet 1D) otal sion with animal (from Worksheet 1F) sion with fixed object (from Worksheet 1F)	(7) from Worksheet 1H; and	(7) from Worksheet 1H	(7) from Worksheet 1H; and
	(8) from Worksheet 1I and 1J		(8) from Worksheet 1I and 1J
	MULTIPLE-VEHICLE	•	
Rear-end collisions (from Worksheet 1D)	0.179	0.383	0.562
Head-on collisions (from Worksheet 1D)	0.004	0.004	0.008
Angle collisions (from Worksheet 1D)	0.009	0.021	0.029
Sideswipe, same direction (from Worksheet 1D)	0.011	0.129	0.140
Sideswipe, opposite direction (from Worksheet 1D)	0.002	0.001	0.003
Oriveway-related collisions (from Worksheet 1H)	0.024	0.061	0.085
Other multiple-vehicle collision (from Worksheet 1D)	0.010	0.041	0.051
Subtotal	0.239	0.640	0.878
	SINGLE-VEHICLE		
Collision with animal (from Worksheet 1F)	0.000	0.006	0.006
Collision with fixed object (from Worksheet 1F)	0.010	0.072	0.082
Collision with other object (from Worksheet 1F)	0.001	0.001	0.002
Other single-vehicle collision (from Worksheet 1F)	0.010	0.010	0.019
Collision with pedestrian (from Worksheet 1I)	0.019	0.000	0.019
Collision with bicycle (from Worksheet 1J)	0.005	0.000	0.005
Subtotal	0.044	0.089	0.133
- Total	0.283	0.729	1.011

V	Vorksheet 1L Summary Results for U	rban and Suburban Roadway Segmen	nts
(1)	(2)	(3)	(4)
Crash Severity Level	Predicted average crash frequency, N predicted rs (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)
	(Total) from Worksheet 1K		(2) / (3)
Total	1.0	0.12	8.4
Fatal and injury (FI)	0.3	0.12	2.4
Property damage only (PDO)	0.7	0.12	6.1

	Worksheet 2A General Information and Input	Data for Orban and Suburban Ar	
	Information		Location Information
Analyst	TL	Roadway	Wootton Parkway
Agency or Company	ATCS	Intersection	At Tower Oaks Boulevard
Date Performed	12/07/21	Jurisdiction	Montgomery County
		Analysis Year	2045
· · · · · · · · · · · · · · · · · · ·	ut Data	Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)	AADT		4SG
AADT _{major} (veh/day)	$AADT_{MAX} = 67,700 (veh/day)$		25,867
AADT minor (veh/day)	$AADT_{MAX} = 33,400 (veh/day)$		6,254
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C _i		1.00	1.00
Data for unsignalized intersections only:			
Number of major-road approaches with left-	-turn lanes (0,1,2)	0	0
Number of major-road approaches with righ	nt-turn lanes (0,1,2)	0	0
Data for signalized intersections only:			
Number of approaches with left-turn lanes ((0,1,2,3,4) [for 3SG, use maximum value of 3]	0	4
Number of approaches with right-turn lanes	s (0,1,2,3,4) [for 3SG, use maximum value of 3]	0	4
Number of approaches with left-turn signal	phasing [for 3SG, use maximum value of 3]		4
Type of left-turn signal phasing for Leg #1		Permissive	Protected
Type of left-turn signal phasing for Leg #2			Permissive / Protected
Type of left-turn signal phasing for Leg #3			Permissive / Protected
Type of left-turn signal phasing for Leg #4 (if applicable)		Permissive / Protected
Number of approaches with right-turn-on-re	ed prohibited [for 3SG, use maximum value of 3]	0	0
Intersection red light cameras (present/not		Not Present	Not Present
Sum of all pedestrian crossing volumes (Pe	edVol) Signalized intersections only		122
Maximum number of lanes crossed by a pe	edestrian (n _{lanesx})		7
Number of bus stops within 300 m (1,000 ft) of the intersection	0	2
Schools within 300 m (1,000 ft) of the inters	\1 /	Not Present	Not Present
Number of alcohol sales establishments wit	thin 300 m (1,000 ft) of the intersection	0	0

	Worksheet 2B Crash Modification Factors for Urban and Suburban Arterial Intersections									
(1)	(2)	(3)	(4)	(5)	(6)	(7)				
CMF for Left-Turn Lanes	CMF for Left-Turn Signal	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF				
	Phasing									
CMF 1i	CMF 2i	CMF 3i	CMF 4i	CMF 5i	CMF 6i	CMF _{COMB}				
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)				
0.66	0.91	0.85	1.00	0.91	1.00	0.47				

	Worksheet 2C Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections											
(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Crash Severity Level	SPF Coefficients		ash Severity Level SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted	
			Parameter, k	Initial N _{bimv}	Crashes	N_{bimv}	CMFs	Factor, C	N _{bimv}			
	from Table 12-10		from Table 12-10	from Equation 12-		(4) _{TOTAL} *(5)	(7) from	(6)*(7)*(9)				
	а	b	С	IIOIII Table 12-10	21		(4)TOTAL (3)	Worksheet 2B		(6)*(7)*(8)		
Total	-10.99	1.07	0.23	0.39	6.635	1.000	6.635	0.47	1.00	3.090		
Fotol and Injury (FI)	-13.14	1.18	0.22	0.33	2.166	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	2.247	0.47	4.00	1.046		
Fatal and Injury (FI)	-13.14	1.10	0.22	0.33	2.100	0.339	2.241	0.47	1.00	1.040		
Property Damage Only	44.00	4.00	0.04	0.44	4.000	(5) _{TOTAL} -(5) _{FI}	4.000	0.47	4.00	0.040		
(PDO)	-11.02	1.02	0.24	0.44	4.228	0.661	4.388	0.47	1.00	2.043		

	Worksheet 2D Multiple-	Vehicle Collisions by Collis	sion Type for Urban and Suburb	an Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type(FI)	Predicted N bimv (FI) (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bimv (PDO) (crashes/year)	Predicted N _{bimv (TOTAL)} (crashes/year)
	from Table 12-11	(9)FI from Worksheet 2C	from Table 12-11	(9)PDO from Worksheet 2C	(9)PDO from Worksheet 2C
Total	1.000	1.046	1.000	2.043	3.090
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.450	0.471	0.483	0.987	1.458
Head-on collision	0.049	0.051	0.030	0.061	0.113
Angle collision	0.347	0.363	0.244	0.499	0.862
Sideswipe	0.099	0.104	0.032	0.065	0.169
Other multiple-vehicle collision	0.055	0.058	0.211	0.431	0.489

	Worksheet 2E Single-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections																	
(1)	(2)		(2)		(4)	(5)	(6)	(7)	(8)	(9)								
	S	SPF Coefficients		Overdispersion		Proportion of Total	Adjusted	Combined	Calibration	Predicted								
				Parameter, k	Initial N _{bisv}	Crashes	N_{bimv}	CMFs	Factor, C _i	N_{bisv}								
Crash Severity Level	fr	om Table 12-1	2		from Eqn. 12-24;		(4) _{TOTAL} *(5)	(7) from		(6)*(7)*(8)								
		h	_	from Table 12-12	(FI) from Eqn. 12-		(4)TOTAL (3)	Worksheet 2B		(0) (1) (8)								
	а	b	С		24 or 12-27													
Total	-10.21	0.68	0.27	0.36	0.390	1.000	0.390	0.47	1.00	0.182								
Fatal and Injury (FI)	-9.25	0.43	0.43	0.43	0.43	0.43	0.43	0.42	0.43	0.43	0.29	0.09	0.096	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$	0.096	0.47	1.00	0.045
ratarand injury (i i)	-9.23	0.43	0.29	0.09	0.090	0.247	0.090	0.47	1.00	0.045								
Property Damage Only	-11.34	0.78	0.25	0.44	0.292	(5) _{TOTAL} -(5) _{FI}	0.294	0.47	1.00	0.137								
(PDO)	-11.34	0.76	0.25	0.44	0.292	0.753	0.294	0.47	1.00	0.137								

	Worksheet 2F Single-V	ehicle Collisions by Collis	ion Type for Urban and Suburba	n Arterial Intersections	
(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	Proportion of Collision Type _(FI)	Predicted N _{bisv (FI)} (crashes/year)	Proportion of Collision Type (PDO)	Predicted N bisv (PDO) (crashes/year)	Predicted N _{bisv (TOTAL)} (crashes/year)
	from Table 12-13	(9) _{FI} from Worksheet 2E	from Table 12-13	(9)PDO from Worksheet 2E	(9)PDO from Worksheet 2E
Total	1.000	0.045	1.000	0.137	0.182
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.000	0.000
Collision with fixed object	0.744	0.033	0.870	0.119	0.152
Collision with other object	0.072	0.003	0.070	0.010	0.013
Other single-vehicle collision	0.040	0.002	0.023	0.003	0.005
Single-vehicle noncollision	0.141	0.006	0.034	0.005	0.011

Worksheet 2G Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections						
(1)	(2)	(3)	(4)	(5)	(7)*	
Crach Savarity Laval	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Predicted N _{pedi}	
Crash Severity Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)	
Total				-		
Fatal and injury (FI)				-		

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H Crash M	Worksheet 2H Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections						
(1)	(2)	(3)	(4)				
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF				
CMF _{1p}	CMF _{2p}	CMF _{3p}	Combined CiviF				
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)				
2.78	1.00	1.00	2.78				

Worksheet 2I Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections										
(1)		(2)				(3)	(4)	(5)	(6)	(7)
Crash Severity Level	SPF Coefficients			Overdispersion	N _{pedbase}	Combined CMF	Calibration	Predicted N _{pedi}		
Crash Seventy Level	from Table 12-14			Parameter, k	from Equation 12-29	(4) from Worksheet 2H	factor, C _i	(4)*(5)*(6)		
	а	b	С	d	е		IIOIII Equation 12-25	(4) HOITI WORKSHEET ZIT		(4) (3) (0)
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.037	2.78	1.00	0.102
Fatal and Injury (FI)									1.00	0.102

Worksheet 2J Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections						
(1)	(2)	(3)	(4)	(5)	(7)*	
Crach Savarity Laval	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{bikei}	Predicted N _{bikei}	
Crash Severity Level	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)	
Total	3.090	0.182	3.271	0.015	0.049	
Fatal and injury (FI)		-			0.049	

^{*} Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksr	neet 2K Crash Severity Distribution for Urban a	nd Suburban Arterial Intersections	
(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 2D and 2F;	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F;
	(7) from 2G or 2I and 2J		(7) from 2G or 2I and 2J
	MULTIPLE-VEHICLE	·	•
Rear-end collisions (from Worksheet 2D)	0.471	0.987	1.458
Head-on collisions (from Worksheet 2D)	0.051	0.061	0.113
Angle collisions (from Worksheet 2D)	0.363	0.499	0.862
Sideswipe (from Worksheet 2D)	0.104	0.065	0.169
Other multiple-vehicle collision (from Worksheet 2D)	0.058	0.431	0.489
Subtotal	1.046	2.043	3.090
	SINGLE-VEHICLE		
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 2F)	0.033	0.119	0.152
Collision with other object (from Worksheet 2F)	0.003	0.010	0.013
Other single-vehicle collision (from Worksheet 2F)	0.002	0.003	0.005
Single-vehicle noncollision (from Worksheet 2F)	0.006	0.005	0.011
Collision with pedestrian (from Worksheet 2G or 2I)	0.102	0.000	0.102
Collision with bicycle (from Worksheet 2J)	0.049	0.000	0.049
Subtotal	0.196	0.137	0.333
Total	1.242	2.180	3.422

Worksheet 2L Summary Results for Urban and Suburban Arterial Intersections				
(1)	(2)			
Crash severity level	Predicted average crash frequency, N _{predicted int} (crashes/year)			
	(Total) from Worksheet 2K			
Total	3.4			
Fatal and injury (FI)	1.2			
Property damage only (PDO)	2.2			



Crossroad Predictive Crash Analysis Predicted Crash Frequency for Six-Lane and OneWay Urban and Suburban Arterials using NCHRP

Report 17-58

for the

No Build Scenario

General Information	<u>Sit</u> e Ir	nformation	
Analyst PC	' 	t number CO-166	
Agency ATCS		name Democracy Blvd from Taves	shire
Date 1/31/2022		ent number 1	511110
Location Montgomery County	•	sis year 2045	
Add to Totals worksheet	Restore equations	Reset input cells	
Output Summary Predicted crass	h frequency, crashes / ye	ear Combined CMF	
F+I	PDO Total		PDO
Total crashes 0.674	0.933 1.607		0.685
Multiple-vehicle crashes 0.437	0.679	Single-vehicle crashes 2.266 2	2.266
Single-vehicle crashes 0.201	0.254	Soverity distribution for Ett graphes	
Vehicle-pedestrian crashes 0.024 Vehicle-bicycle crashes 0.013		Severity distribution for F+I crashes K A B	_
Vehicle-bicycle crashes 0.013			0.405
Input Data	<u>Value</u>	Advisory Messages	
Basic Roadway Data	_		
Area type	Suburban		
Segment type	6D	•	
Segment length, mi	0.13	•	
Annual average daily traffic (AADT), veh/day	40327	•	
Number of highway-rail grade crossings present		•	
Posted speed limit, mi/h	35	•	
Automated speed enforcement present?	No	•	
Access Data			
Driveway count Major commercial	1	8 major comm. driveways per mile.	
Major industrial	0		
Minor	0	•	
Cross Section Data			
Lane width, ft	10		
Outside shoulder width, ft	1.5		
Median width, ft	23		
Median barrier present?	Yes	•	
Roadside Data			
Roadside fixed object count	5	38 objects per mile.	
Average roadside fixed object offset, ft	7	•	
Calibration Factors	<u>Value</u>	<u>Default Values</u>	
Local calibration factor (C)	1.000	1.000	
Adjustment factor for pedestrians (f_{ped})	0.015	0.015	
Adjustment factor for bicyclists (f_{bike})	0.008	0.008	
Severity distribution calibration factor ($C_{sdf,tws}$)	1.000	1.000	
Crash Modification Factors	F+I	PDO Mathiela Ciarle	
Lane width	Multiple Single	<u>Multiple Single</u> .045 1.045 1.045	
Outside shoulder width		.000 1.000 1.000	
Median width		.955 0.955 0.955	
Median barrier		.967 0.600 1.967	
Highway-rail grade crossing		.000 1.000 1.000	
Major commercial driveways	1.220	1.220	
Major industrial driveways	0.989	0.989	
Minor driveways	0.947	0.947	
Automated speed enforcement		.000 1.000 1.000	
Roadside fixed objects		.154 1.154	

General Information		<u></u>	te Information	
Analyst PC		S	reet number	CO-166
Agency ATCS		S	reet name	Democracy Blvd from I-270 On-F
Date 1/31/2022			egment number	2
Location Montgomery	County	Α	nalysis year	2045
Add to Totals worksh	neet	Restore equation	5	Reset input cells
Output Summary		frequency, crashes	/year	Combined CMF
T-4-1		PDO Total	N 4 - 14 1	F+I PDO
ו סנמו Multiple-vehicle		2.499 4.322 1.662		nicle crashes 0.527 0.527 nicle crashes 2.299 2.299
Single-vehicle		0.838	Single-vei	licie ciasiles Z.299 Z.299
Vehicle-pedestrian		0.000	Severity	distribution for F+I crashes
Vehicle-bicycle				K A B C
,			0.02	
Input Data		<u>Value</u>	<u>Advisory</u>	Messages
Basic Roadway Data				
Area type		Suburban		
Segment type		6D 0.43	•	
Segment length, mi Annual average daily tra	ffic (AADT) veh/day	38902	•	
Number of highway-rail (0	•	
Posted speed limit, mi/h	grado orodonigo prodont	35		
Automated speed enforce	ement present?	No		
Access Data				
Driveway count M	ajor commercial	0		
	ajor industrial	2	5 major	industrial driveways per mile.
М	inor	0	•	
Cross Section Data				
Lane width, ft		12		
Outside shoulder width,	ft	1.5		
Median width, ft		23		
Median barrier present?		Yes	•	
Roadside Data				
Roadside fixed object co		24	56 objec	ts per mile.
Average roadside fixed of	објест опѕет, тт	Value	•	Default Values
Calibration Factors	C \	<u>Value</u>		<u>Default Values</u>
Local calibration factor (•	1.000		1.000
Adjustment factor for pe	•	0.015		0.015
Adjustment factor for bio		0.008		0.008
Severity distribution calib		1.000		1.000
Crash Modification Factor	<u>ors</u>	F+I Multiple S	ingle	PDO Multiple Single
Lane width		1.000	1.000	1.000 1.000
Outside shoulder width		1.000	1.000	1.000 1.000
Median width		0.955	0.955	0.955 0.955
Median barrier		0.600	1.967	0.600 1.967
Highway-rail grade cross		1.000	1.000	1.000 1.000
Major commercial drivev		0.932		0.932
Major industrial driveway	/S	1.040		1.040
		0.947		0.947
Minor driveways Automated speed enford	rement	1.000	1.000	1.000 1.000

Safety Pre	ediction Worksheet	<u>for Urban an</u>	d Suburb	an Arterial I	ntersec	tions			
General In	formation				Site Infor	rmation_			
Analyst	PC			1	Major str	eet name	Democracy	Blvd	
Agency	ATCS					eet name	Taveshire \		
Date	1/31/2022					ion number	1		
Location	Montgomery County	1			Analysis	year	2045		
Add to	Totals worksheet		Re	store equatio	ns		Re	set input cells	
Output Su	<u>mmary</u>	Predicted c	rash frequ PDO	ency, crashe Total	es / year			Combined CN F+I	//F PDO
	Total crashe	s 2.365	2.136	4.501		Total-vehic	cle crashes	0.723	0.723
	Total-vehicle crashe		2.136		Veh	nicle-pedestri	an crashes	1.000	
	cle-pedestrian crashe ′ehicle-bicycle crashe						istribution fo	r F+I crashes	
						0.014	0.131	0.659	1.562
Input Data	•			<u>Value</u>		Advisory N	<u>Messages</u>		
Intersection Area type	n Data			Suburban		_			
Number of	f leas			3		3SG inter	section typ	e	
Traffic con	•			Signalized			zacach typ	-	
Lighting pr				Yes		-			
Red-light of	cameras present?			No		_ .			
	estrian volume crossir			166		<u>.</u>			
	number of lanes cros			8					
	f bus stops within 1,0			0 No		·			
. ,	present within 1,000 lles establishments w		UII?	0		·			
Street Dat	а			Major	Minor				
Street con				Two-way	Гwo-way	2x2 inters	ection con	figuration	
	erage daily traffic (AA	ADT), veh/day		40795	407	'5 .			
	f through lanes			6		4.			
	f approaches with left			0		1.			
	f left-turn movements	•		0		1 0.			
	f right-turn movement f U-turn movements p	•	nreu	2		<u>0</u> . 1.			
	f approaches with rigi		elization	0		0			
Calibration	n Factors			<u>Value</u>			Default Val	ues	
Local calib	oration factor (C)			1.000			1.000		
Adjustmen	nt factor for pedestria	ns for stop coi	ntrol (f _{ned})	0.051			0.051		
	nt factor for bicyclists		(pcu)	0.029			0.029		
-	istribution calibration		(C adf tui)	1.000			1.000		
	istribution calibration			1.000			1.000		
	of fatality given K+A			0.094			0.094		
1 TODGDIIITY	or latality given it.	Severity (KI)	K+A /		or of Co	llicion Prono			
2x.	2 intersections	3ST, F+I	<u>3ST, P</u> DO			<u>llision Propor</u> O 4ST, F+I		4SG, F+I 4S	G, PDO
	collision proportion	0.094	0.154		0.18	_		0.083	0.148
Angle coll	ision proportion	0.764	0.629	0.676	0.55	0.806	0.707	0.746	0.552
	1x1 intersections							4SG, F+I 4S	
	collision proportion	0.100	0.100		0.14	_	0.065	0.030	0.059
Angle coll	ision proportion	0.300	0.250		0.57	0.822		0.837	0.733
	<u>dification Factors</u> cle crash CMFs			F+I			PDO		
Lighting				0.911			0.911		
Red-light of	cameras			1.000			1.000		
Left-turn s	ignal phasing			0.860			0.860		
Right-turn-	-on-red			1.000			1.000		
				0.885			0.885		
U-turn pro				1.000			1.000		
U-turn pro Right-turn	channelization								
	channelization f lanes			1.043			1.043		
Right-turn Number of Vehicle-pe		5					1.043		
Right-turn Number of	flanes	3		1.043 1.000 1.000			1.043		

Safety Prediction Worksheet	for Urban an	d Suburb	an Arterial li	ntersect	tions			
General Information				Site Infor	mation			
Analyst PC			_		eet name	Democracy	Blvd	
Agency ATCS				•	eet name	Fernwood F		
Date 1/31/2022			li	ntersecti	on number	2		
Location Montgomery County			P	nalysis	year	2045		
Add to Totals worksheet		Res	store equation	ns		Res	set input cells	
Output Summary	Predicted c	rash frequ PDO	ency, crashe Total	s / year			Combined Ci F+I	MF PDO
Total crashes		3.552				cle crashes	0.752	0.752
Total-vehicle crashes		3.552		Veh	iicle-pedestri	an crashes	4.150	
Vehicle-pedestrian crashe: Vehicle-bicycle crashe:					Severity d	istribution fo	r F+I crashes	
Vernoie-bioyele drastie.	3 0.100				K		В	, c
					0.023		1.122	2.874
Input Data			<u>Value</u>		Advisory N	<u> lessages</u>		
Intersection Data			Cubunt		_			
Area type Number of legs			Suburban 4		4SG inter	section type	۵	
Traffic control type			Signalized			occaon type	-	
Lighting present?			Yes		<u> </u>			
Red-light cameras present?			Yes					
Daily pedestrian volume crossin	• • • • • • • • • • • • • • • • • • • •	• ,	328		<u>.</u>			
Maximum number of lanes cros Number of bus stops within 1,00			2		- :			
School(s) present within 1,000 f			No		- :			
Alcohol sales establishments wi			0		.			
Street Data			Major M	<i>linor</i>				
Street configuration				wo-way		ection conf	figuration	
Annual average daily traffic (AA	.DT), veh/day		28351	1285				
Number of through lanes	turn lance		6		<u>4</u> .			
Number of approaches with left- Number of left-turn movements		d nhasing	2		<u> </u>			
Number of right-turn movements	•		0		0.			
Number of U-turn movements p			0		0.			
Number of approaches with righ	nt-turn channe	elization	2		2.			
<u>Calibration Factors</u>			<u>Value</u>			<u>Default Val</u>	<u>ues</u>	
Local calibration factor (C)			1.000			1.000		
Adjustment factor for pedestrian		ntrol (f_{ped})	0.049			0.049		
Adjustment factor for bicyclists (0.019			0.019		
Severity distribution calibration t			1.000			1.000		
Severity distribution calibration f			1.000			1.000		
Probability of fatality given K+A	severity (P _{K I}	_{K+A})	0.094			0.094		
2x2 intersections	3ST F+/	3ST PD∩	<u>Manne</u> 3SG, F+I 3		<u>llision Propoi</u> O 4ST F+I		4SG F+1 4S	SG PDO
Rear-end collision proportion	0.094	0.154		0.18			0.083	0.148
Angle colllision proportion	0.764	0.629		0.55			0.746	0.552
1x2 or 1x1 intersections	3ST, F+I	3ST, PDO	3SG, F+1 3			4ST, PDO	4SG, F+I 45	G, PDO
Rear-end collision proportion	0.100	0.100	0.111	0.14		0.065	0.030	0.059
Angle colllision proportion	0.300	0.250		0.57	1 0.822		0.837	0.733
Crash Modification Factors			F+I			PDO		
Total-vehicle crash CMFs								
Lighting			0.911			0.911		
Red-light cameras			0.851			0.851		
Left-turn signal phasing			0.547			0.547		
Right-turn-on-red			1.000			1.000		
U-turn prohibition			1.000			1.000		
Right-turn channelization Number of lanes			1.545			1.545		
			1.148			1.148		
Vehicle-pedestrian crash CMFs			A 150					
Bus stops Schools			4.150 1.000					
Alcohol sales establishments			1.000					

Safety Prediction Worksheet	for Urban an	d Suburb	an Arterial I	ntersecti	ions			
General Information				Site Inforr				
Analyst TL			_	∕lajor stre		MD 187 OI	d Georgetow	n Rd
Agency ATCS				/linor stre			Vay/Manor C	
Date 1/31/2022					on number	1	,	,
Location Montgomery County			A	Analysis y	/ear	2045		
Add to Totals worksheet		Res	store equation	ns		Re	set input cells	
Output Summary	Predicted c	rash frequ PDO	ency, crashe Total	s / year			Combined C F+I	MF PDO
Total crashe	s 4.450	3.578	8.027		Total-vehic	cle crashes	0.911	0.911
Total-vehicle crashe		3.578		Vehi	cle-pedestri	an crashes	5.603	
Vehicle-pedestrian crashe Vehicle-bicycle crashe					Severity di	istribution fo	r F+I crashes	
verilcie-bicycle crasile	0.144				K	Siribulion 10 A	B	, c
					0.024	0.235	1.176	3.014
Input Data			<u>Value</u>		Advisory M	<u>lessages</u>		
Intersection Data					_			
Area type			Suburban				_	
Number of legs Traffic control type			4 Signalized		45G inters	section typ	e	
Lighting present?			Yes		Ħ.			
Red-light cameras present?			No					
Daily pedestrian volume crossir		• ,	301		Ţ.			
Maximum number of lanes cros			8		ŀ			
Number of bus stops within 1,00 School(s) present within 1,000			6 Yes		·			
Alcohol sales establishments w		JII:	0		:			
Chroat Data			Maiau	Aire au	_			
Street Data			-,-	⁄linor	Ta a			
Street configuration Annual average daily traffic (AA	DT) vob/dov		Two-way 7	wo-way 3590		ection conf	iguration	
Number of through lanes	(DT), veri/day		6	3090	_			
Number of approaches with left	-turn lanes		2	(
Number of left-turn movements	•		0	(_			
Number of right-turn movement	•	n red	0	(
Number of U-turn movements p Number of approaches with right		elization	0	(_			
Calibration Factors	TE TOTAL TITLE	JIIZGUOII	<u>Value</u>		<u>/1</u> •	Default Val	IIAS	
Local calibration factor (C)							ues	
Adjustment factor for pedestrial	as for stap sou	atral (f)	1.000 0.049			1.000		
		ItiOi (I ped)	0.049			0.049		
Adjustment factor for bicyclists Severity distribution calibration		(C)	1.000			0.019 1.000		
Severity distribution calibration			1.000					
Probability of fatality given K+A			0.094			1.000 0.094		
	23,2111, fr K	\+A /		er of Call	ision Propor			
2x2 intersections	3ST, F+I 3	3ST, PDO			•		4SG, F+I 4S	SG, PDO
Rear-end collision proportion	0.094	0.154		0.189			0.083	0.148
Angle collision proportion	0.764	0.629	0.676	0.554			0.746	0.552
1x2 or 1x1 intersections							4SG, F+I 4S	
Rear-end collision proportion Angle colllision proportion	0.100	0.100 0.250	0.111	0.143		0.065 0.706	0.030	0.059
Crash Modification Factors	0.000	3.200	F+I	3.07	0.022	PDO	0.001	0.100
Total-vehicle crash CMFs								
Lighting			0.911			0.911		
Red-light cameras			1.000			1.000		
Left-turn signal phasing			1.000			1.000		
Right-turn-on-red			1.000			1.000		
U-turn prohibition			1.000			1.000		
Right-turn channelization			1.000			1.000		
Number of lanes			1.000			1.000		
Vehicle-pedestrian crash CMFs	5							
Vehicle-pedestrian crash CMFs Bus stops	•		4.150					
· · · · · · · · · · · · · · · · · · ·	•		4.150 1.350 1.000					

General Information	rban and Suburban Arte Site II	nformation
Analyst TL		t number MD 187
Agency ATCS		t name Lone Oak Way/Manor Oak Wa
Date 1/31/2022		nent number 1
Location Montgomery County	•	sis year 2045
Add to Totals worksheet	Restore equations	Reset input cells
	sh frequency, crashes / ye	
F+/	PDO Total	F+I PD
Total crashes 1.420	1.897 3.317	Multiple-vehicle crashes 0.569 0.56
Multiple-vehicle crashes 0.920 Single-vehicle crashes 0.425	1.365 0.532	Single-vehicle crashes 2.308 2.30
Vehicle-pedestrian crashes 0.049	0.332	Severity distribution for F+I crashes
Vehicle-bicycle crashes 0.026		K A B
		0.017 0.112 0.437 0.88
Input Data	<u>Value</u>	Advisory Messages
Basic Roadway Data		
Area type	Suburban	•
Segment type	6D	•
Segment length, mi	0.24	•
Annual average daily traffic (AADT), veh/day Number of highway-rail grade crossings presen	52101 t	•
Posted speed limit, mi/h	35	•
Automated speed enforcement present?	No	:
Access Data		
Driveway count Major commercial	0	
Major industrial	0	
Minor	2	8 minor driveways per mile.
Cross Section Data		
Lane width, ft	11	
Outside shoulder width, ft	1	
Median width, ft	15	
Median barrier present?	Yes	•
Roadside Data		
Roadside fixed object count	9	38 objects per mile.
Average roadside fixed object offset, ft	Notice 8	P-F
Calibration Factors	<u>Value</u>	Default Values
Local calibration factor (C)	1.000	1.000
Adjustment factor for pedestrians (f _{ped})	0.015	0.015
Adjustment factor for bicyclists (f_{bike})	0.008	0.008
Severity distribution calibration factor (C _{sdf,tws})	1.000	1.000
Crash Modification Factors	F+I Multiple Single	PDO e Multiple Single
Lane width	· · · · · · · · · · · · · · · · · · ·	.022 1.022 1.022
Outside shoulder width		.014 1.014 1.014
Median width	1.000 1	.000 1.000 1.000
Median barrier		.967 0.600 1.967
Highway-rail grade crossing		.000 1.000 1.000
Major commercial driveways	0.932	0.932
Major industrial driveways	0.989	0.989
N. A. C. C. C. C. C. C. C. C. C. C. C. C. C.		
Minor driveways Automated speed enforcement	0.991 1.000 1	.000 0.991 1.000

General Information	Site Info	<u>ormation</u>
Analyst TL	Street n	number MD 187
Agency ATCS	Street n	
Date 1/31/2022		nt number 2
Location Montgomery County	Analysis	
Add to Totals worksheet	Restore equations	Reset input cells
Output Summary Predicted cra	ash frequency, crashes / yea	r Combined CMF
F+/	PDO Total	F+I PD
Total crashes 0.451	0.602 1.052	Multiple-vehicle crashes 0.535 0.5
Multiple-vehicle crashes 0.270	0.405	Single-vehicle crashes 2.614 2.6
Single-vehicle crashes 0.157	0.197	
Vehicle-pedestrian crashes 0.015		Severity distribution for F+I crashes
Vehicle-bicycle crashes 0.008		K A B 0.005 0.036 0.139 0.2
Input Data	Value	
Input Data	<u>Value</u>	<u>Advisory Messages</u>
Basic Roadway Data Area type	Suburban	
Segment type	6D	•
Segment type Segment length, mi	0.08	•
Annual average daily traffic (AADT), veh/day	49489	•
Number of highway-rail grade crossings prese		•
Posted speed limit, mi/h	35	•
Automated speed enforcement present?	No	•
ratemated opera emercement procent.	110	•
Access Data		
Driveway count Major commercial	0	•
Major industrial	0	
Minor	0	•
Cross Section Data		
Lane width, ft	11	
Outside shoulder width, ft	1	
Median width, ft	18	
Median barrier present?	Yes	
Pandaida Data		
Roadside Data Roadside fixed object count	9	113 objects per mile.
Average roadside fixed object offset, ft	10	
Calibration Factors	<u>Value</u>	<u>Default Values</u>
Local calibration factor (C)	1.000	1.000
Adjustment factor for pedestrians (f_{ped})	0.015	0.015
Adjustment factor for bicyclists (f _{bike})	0.008	0.008
Severity distribution calibration factor ($C_{sdf,tws}$)		1.000
Crash Modification Factors	F+I	PDO
	Multiple Single	Multiple Single
Lane width	1.022 1.0	
Outside shoulder width	1.014 1.0	
Median width	0.983 0.9	
Median barrier	0.600 1.9	
Highway-rail grade crossing	1.000 1.0	_
Major commercial driveways	0.932	0.932
Major industrial driveways	0.989	0.989
Minor driveways	0.947	0.947
Automated speed enforcement Roadside fixed objects	1.000 1.0 1.3	1.000 1.000

Safety Prediction Worksheet	for Urban an	d Suburb	an Arterial I	ntersec	tions			
General Information			<u> </u>	Site Info	rmation_			
Analyst TL			M	∕lajor str	reet name	MD 187 Old	Georgetowr	n Rd
Agency ATCS					reet name	Ryland Dr		
Date 1/31/2022			-		tion number	2		
Location Montgomery County	У		F	Analysis	year	2045		_
Add to Totals worksheet		Re	store equation	ns		Res	et input cells	
Output Summary	Predicted c	rash frequ PDO	iency, crashe Total	s / year	•	(Combined Cl F+l	MF PDO
Total crashe		3.595				cle crashes	0.911	0.911
Total-vehicle crashe		3.595		Veł	nicle-pedestr	ian crashes	5.603	
Vehicle-pedestrian crashe Vehicle-bicycle crashe						listribution for	F+I crashes	c
					0.024		1.161	2.976
Input Data Intersection Data			<u>Value</u>		Advisory I	<u>Messages</u>		
Area type			Suburban		■.			
Number of legs			4		4SG inter	section type)	
Traffic control type			Signalized					
Lighting present?			Yes		<u>.</u>			
Red-light cameras present? Daily pedestrian volume crossi	na all leas (ne	de/day)	No 182		•			
Maximum number of lanes cross			7		- :			
Number of bus stops within 1,0			5					
School(s) present within 1,000		on?	Yes					
Alcohol sales establishments v	vithin 1,000 ft		0	_				
Street Data			Major I	Minor				
Street configuration Annual average daily traffic (A	ADT), veh/day		Two-way 7 49427	wo-way 379		section conf	iguration	
Number of through lanes			6		2.			
Number of approaches with lef Number of left-turn movements		d nhaoina	0		0.			
Number of right-turn movemen	•		0		0.			
Number of U-turn movements	•		0		0.			
Number of approaches with rig	ht-turn channe	elization	0		0.			
Calibration Factors			<u>Value</u>			<u>Default Valu</u>	<u>ies</u>	
Local calibration factor (C)			1.000			1.000		
Adjustment factor for pedestria	ns for stop co	ntrol (f _{ped})	0.049			0.049		
Adjustment factor for bicyclists	,		0.019			0.019		
Severity distribution calibration			1.000			1.000		
Severity distribution calibration			1.000			1.000		
Probability of fatality given K+A	A severity (P _K	_{K+A})	0.094			0.094		
Ov O internetions	207 5.4	207 000			Ilision Propo		400 E.I. 40	20. 800
2x2 intersections Rear-end collision proportion	0.094	0.154		0.18		4ST, PDO 0.098	0.083	0.148
Angle collision proportion	0.764	0.629		0.55			0.746	0.552
1x2 or 1x1 intersections		3ST, PDO				4ST, PDO	•	
Rear-end collision proportion	0.100	0.100		0.14			0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.57	71 0.822	0.706	0.837	0.733
Crash Modification Factors Total-vehicle crash CMFs			F+I			PDO		
Lighting			0.911			0.911		
Red-light cameras			1.000			1.000		
Left-turn signal phasing			1.000			1.000		
Right-turn-on-red			1.000			1.000		
U-turn prohibition			1.000			1.000		
Right-turn channelization			1.000			1.000		
Number of lanes			1.000			1.000		
Vehicle-pedestrian crash CMF	s							
Bus stops			4.150					
Schools Alcohol sales establishments			1.350 1.000					
MICOTION SOMES ESTABLISHMENTS			1.000					

General Information	Site Inf	formation	
Analyst PC	Street r	number	MD 187
Agency ATCS	Street r	name	Old Georgetown Rd from Rock S
Date 1/31/2022	•	nt number	1
Location Montgomery County	Analysi	is year	2045
Add to Totals worksheet	Restore equations		Reset input cells
Output Summary Predicted cra	ash frequency, crashes / yea	ar	Combined CMF
F+I	PDO Total		F+I PDO
Total crashes 0.848	1.090 1.938	Multiple-vehi	
Multiple-vehicle crashes 0.364 Single-vehicle crashes 0.440	0.539 0.551	Single-veni	cle crashes 5.686 5.686
Vehicle-pedestrian crashes 0.028	0.551	Severity d	listribution for F+I crashes
Vehicle-bicycle crashes 0.015		K	
		0.013	
Input Data	<u>Value</u>	Advisory N	<u>Messages</u>
Basic Roadway Data			
Area type	Suburban		
Segment type	6D	•	
Segment length, mi	0.1	•	
Annual average daily traffic (AADT), veh/day Number of highway-rail grade crossings prese	53058 ent 0	•	
Posted speed limit, mi/h	40	•	
Automated speed enforcement present?	No		
Access Data			
Driveway count Major commercial	0		
Major industrial	0		
Minor	1	10 minor	driveways per mile.
Cross Section Data			
Lane width, ft	12		
Outside shoulder width, ft	1.5		
Median width, ft	23		
Median barrier present?	Yes		
Roadside Data			
Roadside fixed object count	30	300 objec	ts per mile.
Average roadside fixed object offset, ft	3	•	
Calibration Factors	<u>Value</u>		Default Values
Local calibration factor (C)	1.000		1.000
Adjustment factor for pedestrians (f_{ped})	0.015		0.015
Adjustment factor for bicyclists (f _{bike})	0.008		0.008
Severity distribution calibration factor ($C_{\mathit{sdf,tws}}$)	1.000		1.000
Crash Modification Factors	F+I Multiple Single		PDO Multiple Single
Lane width		000	1.000 1.000
Outside shoulder width		000	1.000 1.000
Median width		955	0.955 0.955
Median barrier		967	0.600 1.967
Highway-rail grade crossing		000	1.000 1.000
Major commercial driveways	0.932		0.932
Major industrial driveways	0.989		0.989
Min	1.000		1.000
Minor driveways			
winor driveways Automated speed enforcement Roadside fixed objects	1.000 1.0	000 025	1.000 1.000 3.025

Date 1/31/2022 Segment number 2 Location Montgomery County Analysis year 2045	4.098 4.098
Agency Date 1/31/2022 Segment number Analysis year 2045 Add to Totals worksheet Restore equations Restored Page Analysis year 2045 Action 19	set input cells Combined CMF F+I PDC 0.515 0.515 4.098 4.098
Add to Totals worksheet Add to Totals worksheet Add to Totals worksheet Add to Totals worksheet Add to Totals worksheet Add to Totals worksheet Predicted crash frequency, crashes / year F+I PDO Total Total crashes Multiple-vehicle crashes Single-vehicle crashes Single-vehicle crashes Vehicle-pedestrian crashes Vehicle-bicycle crashes Vehicle-bicycle crashes Vehicle-bicycle crashes Value Advisory Messages Advisory Messages Advisory Messages Basic Roadway Data Area type Segment type Segment type Segment length, mi Annual average daily traffic (AADT), veh/day Number of highway-rail grade crossings present Posted speed limit, mi/h Automated speed enforcement present? Access Data Driveway count Major commercial Major industrial Major industrial Minor Area type Suburban Suburban O 1.4 Advisory Messages Advisory Messages Suburban O 2.4 Advisory Messages Advis	Combined CMF F+I PDC 0.515 0.515 4.098 4.098
Add to Totals worksheet Restore equations	Combined CMF F+I PDC 0.515 0.515 4.098 4.098
Output Summary Predicted crash frequency, crashes / year Total crashes Total crashes Multiple-vehicle crashes Multiple-vehicle crashes 0.543 0.793 Single-vehicle crashes Single-vehicle crashes 0.459 0.573 Severity distribution for K Vehicle-pedestrian crashes 0.036 Severity distribution for K A Vehicle-bicycle crashes 0.019 Severity distribution for K K A 0.016 0.083 Input Data Value Advisory Messages Basic Roadway Data Suburban . Area type Suburban . Segment type Segment length, mi 0.14 Annual average daily traffic (AADT), veh/day 56981 . Number of highway-rail grade crossings present 0 . Posted speed limit, mi/h 40 . Automated speed enforcement present? No . Access Data Driveway count Major industrial Major industrial Minor 0 . Cross Section Data Lane width, ft 1.5 . Lane width, ft 25 . Median barrier present? Yes .	Combined CMF F+I PDC 0.515 0.515 4.098 4.098
Total crashes	F+I PDC 0.515 0.515 4.098 4.098
Total crashes	0.515 0.515 4.098 4.098
Multiple-vehicle crashes Single-vehicle crashes Vehicle-pedestrian crashes Vehicle-bicycle crashes Vehicle-bicycle crashes Value	4.098 4.098
Single-vehicle crashes	•
Vehicle-pedestrian crashes Vehicle-bicycle crashes Vehicle-bicycle crashes Vehicle-bicycle crashes Vehicle-bicycle crashes Value Advisory Messages Basic Roadway Data Area type Segment type Segment length, mi Annual average daily traffic (AADT), veh/day Number of highway-rail grade crossings present Posted speed limit, mi/h Automated speed enforcement present? Access Data Driveway count Major commercial Major industrial Minor Minor Cross Section Data Lane width, ft Outside shoulder width, ft Median width, ft Median barrier present? Roadside Data Severity distribution for K A A 0.016 0.083 Advisory Messages Suburban Suburban Suburban Suburban Sepasages Advisory Messages Advisory Messages Advisory Messages Suburban Suburban Suburban Sepasages Advisory Messages	
Vehicle-bicycle crashes 0.019	r F+I crashes
D.016 D.083 D.016 D.083 D.016 D.083 D.016 D.083 D.016 D.083 D.016 D.083 D.016 D.083 D.016 D.083 D.016 D.083 D.016 D.083 D.016 D.083 D.016 D.01	B C
Basic Roadway Data Area type Segment type Segment length, mi Annual average daily traffic (AADT), veh/day Number of highway-rail grade crossings present Posted speed limit, mi/h Automated speed enforcement present? Access Data Driveway count Major commercial Major industrial Minor Cross Section Data Lane width, ft Outside shoulder width, ft Median width, ft Median barrier present? Suburban 0	0.324 0.633
Area type Segment type Segment length, mi Annual average daily traffic (AADT), veh/day Number of highway-rail grade crossings present Posted speed limit, mi/h Automated speed enforcement present? Access Data Driveway count Major commercial Major industrial Minor Cross Section Data Lane width, ft Outside shoulder width, ft Median width, ft Median barrier present? Suburban 6D . Suburban . Suburban . Suburban . A0 . A1 . A0 . A0 . A0 . A1 . A0 . A1 A1 A1 A1 A1 A1 A1 A1 A1 A1 A1 A1 A1	
Segment type Segment length, mi Annual average daily traffic (AADT), veh/day Number of highway-rail grade crossings present Posted speed limit, mi/h Automated speed enforcement present? Access Data Driveway count Major commercial Major industrial Minor Cross Section Data Lane width, ft Outside shoulder width, ft Median barrier present? Segment type 1.1.1.2	
Segment length, mi Annual average daily traffic (AADT), veh/day Number of highway-rail grade crossings present Posted speed limit, mi/h Automated speed enforcement present? Access Data Driveway count Major commercial Major industrial Minor Cross Section Data Lane width, ft Outside shoulder width, ft Median width, ft Median barrier present? O.14	
Annual average daily traffic (AADT), veh/day Number of highway-rail grade crossings present Posted speed limit, mi/h Automated speed enforcement present? Access Data Driveway count Major commercial Major industrial Minor Cross Section Data Lane width, ft Outside shoulder width, ft Median barrier present? Roadside Data	
Number of highway-rail grade crossings present Posted speed limit, mi/h Automated speed enforcement present? **Roadside Data** No	
Posted speed limit, mi/h Automated speed enforcement present? **Access Data** Driveway count Major commercial 0 .	
Automated speed enforcement present? **Roadside Data** Access Data Driveway count Major commercial 0	
Driveway count Major commercial 0	
Driveway count Major commercial 0	
Major industrial Minor Cross Section Data Lane width, ft Outside shoulder width, ft Median width, ft Median barrier present? Major industrial 0 1 7 minor driveways processor 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
Minor 1 7 minor driveways process Section Data Lane width, ft 12 . Outside shoulder width, ft 1.5 . Median width, ft 25 . Median barrier present? Yes .	
Lane width, ft Outside shoulder width, ft Median width, ft Median barrier present? Roadside Data	er mile.
Outside shoulder width, ft Median width, ft Median barrier present? Roadside Data	
Median width, ft Median barrier present? Roadside Data	
Median barrier present? **Roadside Data** **Tes*** **	
Roadside Data	
Roadside fixed object count 25 179 objects per mile	
Average roadside fixed object offset, ft 3 .	_
Calibration Factors Value Default Value	<u>ues</u>
Local calibration factor (C) 1.000 1.000	
Adjustment factor for pedestrians (f_{ped}) 0.015 0.015	
Adjustment factor for bicyclists (f_{bike}) 0.008	
Severity distribution calibration factor ($C_{sdf,tws}$) 1.000	
<u>Crash Modification Factors</u> F+I PDO Multiple Single Multiple	Single
Lane width 1.000 1.000 1.000	1.000
Outside shoulder width 1.000 1.000 1.000 1.000	1.000
Median width 0.945 0.945 0.945	
Median barrier 0.600 1.967 0.600	0.945
Highway-rail grade crossing 1.000 1.000 1.000	1.967
Major commercial driveways 0.932 0.932	
Major industrial driveways 0.989 0.989	1.967
Minor driveways 0.985 0.985	1.967
Automated speed enforcement 1.000 1.000 1.000 Roadside fixed objects 2.205	1.967

								
Safety Prediction Worksheet f	or Urban and	d Suburb						
General Information			<u>.</u>	Site Infor				
Analyst PC				•		MD 187 (OI		vn Rd)
Agency ATCS					eet name	Rock Spring	g Dr	
Date 1/31/2022					on number	4		
Location Montgomery County			,	Analysis '	year	2045		
Add to Totals worksheet		Res	store equatio	ns		Res	set input cells	
Output Summary	Predicted cr F+I	ash frequ PDO	ency, crashe Total	s / year		(Combined C F+I	MF PDO
Total crashes	4.921	3.792				le crashes	0.619	0.619
Total-vehicle crashes		3.792		Veh	icle-pedestri	an crashes	6.275	
Vehicle-pedestrian crashes					Caucarity di	atribution for	r E I Laracha	
Vehicle-bicycle crashes	0.153				Severity ut K	stribution for A	r+i crasiles B	C
					0.027	0.260	1.301	3.334
Input Data			<u>Value</u>		Advisory N	<u>lessages</u>		
Intersection Data								
Area type			Suburban		<u>_</u> .			
Number of legs			4		4SG inters	section type)	
Traffic control type			Signalized		<u>.</u>			
Lighting present? Red-light cameras present?			Yes No		•			
Daily pedestrian volume crossing	all leas (nea	ds/dav)	256		 			
Maximum number of lanes cross		• ,	8		<u>.</u>			
Number of bus stops within 1,00			2					
School(s) present within 1,000 ft		on?	Yes					
Alcohol sales establishments wit	thin 1,000 ft		2					
Street Data			Major i	<i>Minor</i>				
Street configuration			Two-way	wo-way	2x2 inters	ection conf	iguration	
Annual average daily traffic (AAI	OT), veh/day		52069	1829				
Number of through lanes			6		2.			
Number of approaches with left-			2		1 . 2 .			
Number of left-turn movements was Number of right-turn movements	•		0		<u>2</u> . 0 .			
Number of U-turn movements pr		iiicu	0		0.			
Number of approaches with right		lization	1		0.			
Calibration Factors			Value		<u> </u>	Default Valu	ues	
Local calibration factor (C)			1.000			1.000		
Adjustment factor for pedestrian	s for stop cor	ntrol (f)	0.049			0.049		
Adjustment factor for bicyclists (iti Oi (i pea)	0.019			0.019		
Severity distribution calibration fa		(C)	1.000			1.000		
Severity distribution calibration fa			1.000			1.000		
Probability of fatality given K+A			0.094			0.094		
	אן איזי ניייבייי	TA /		or of O-1	lision Propor			
2x2 intersections	3ST, F+I 3	ST, PDO			<u>IISION Propor</u> O 4ST, F+I		4SG, F+I 45	SG, PDO
Rear-end collision proportion	0.094	0.154	0.120	0.18	9 0.079	0.098	0.083	0.148
Angle colllision proportion	0.764	0.629	0.676	0.55	0.806	0.707	0.746	0.552
1x2 or 1x1 intersections					O 4ST, F+I			
Rear-end collision proportion Angle colllision proportion	0.100	0.100 0.250	0.111	0.14		0.065	0.030	0.059
	0.300	0.230		0.57	0.022	0.706	0.837	0.733
<u>Crash Modification Factors</u> Total-vehicle crash CMFs			F+I			PDO		
			0.044			0.011		
Lighting Red light cameras			0.911			0.911		
Red-light cameras			1.000			1.000		
Left-turn signal phasing			0.547			0.547		
Right-turn-on-red			1.000			1.000		
U-turn prohibition			1.000			1.000		
Right-turn channelization			1.243			1.243		
Number of lanes			1.000			1.000		
Vehicle-pedestrian crash CMFs			4.450					
Bus stops Schools			4.150 1.350					
Alcohol sales establishments			1.350					
, aconordates establishments			1.120					

	ediction Worksheet	ioi Oinaii all	u Subuib						
<u>General In</u>				<u>s</u>	Site Infor	<u>mation</u>			
Analyst	PC				•	eet name		d Georgetow	n Rd)
Agency	ATCS					eet name	Tuckerman	Ln	
Date	1/31/2022					ion number	7		
Location	Montgomery County			P	nalysis	year	2045		
Add to	Totals worksheet		Re	store equation	ns		Res	et input cells	
Output Su	<u>mmary</u>	Predicted c	rash frequ PDO	ency, crashe Total	s / year		(Combined Cl F+I	MF PDO
	Total crashe	s 5.420	4.180	9.600		Total-vehic	cle crashes	0.640	0.640
	Total-vehicle crashe		4.180		Veh	icle-pedestri	an crashes	5.603	
	cle-pedestrian crashe								
V	ehicle-bicycle crashe	s 0.169				•	stribution foi	r F+I crashes	
						0.030	0.286	1.433	3.672
						0.030	0.200	1.433	3.072
Input Data	1			Value		Advisory N	/lessages		
	•					<u>, .a.,</u>	10000,900		
Intersection Area type	ui Dala			Suburban					
Number of	fleas			4		4SG inter	section type	j	
Traffic con	•			Signalized			zoulon type	•	
Lighting pr	• •			Yes		1 .			
	cameras present?			No		- .			
Daily pede	estrian volume crossir	ng all legs (pe	ds/day)	327		-			
Maximum	number of lanes cros	sed by a ped	estrian	7		<u> </u>			
	f bus stops within 1,0			5					
	present within 1,000		on?	Yes					
Alcohol sa	lles establishments w	ithin 1,000 ft		0					
Street Dat				Major N	1inor				
Street con		DT) 1/1			wo-way		ection conf	iguration	
	erage daily traffic (AA	DT), ven/day		57200	2111				
	f through lanes f approaches with left	turn lance		6		<u>4</u> .			
	f left-turn movements		d nhaeina	1		2.			
	f right-turn movement	•		0		1.			
	f U-turn movements p	•	iiica	0		0.			
	f approaches with righ		elization	0		0.			
Calibration	n Factors			Value			Default Valu	ues	
	oration factor (C)								
	` ,			1.000			1.000		
	nt factor for pedestriar		ntrol (f _{ped})				0.049		
-	nt factor for bicyclists			0.019			0.019		
	istribution calibration			1.000			1.000		
Severity d	istribution calibration	factor, 1-way	(C _{sdf,owi})	1.000			1.000		
Probability	of fatality given K+A	severity (PKI	_{K+A})	0.094			0.094		
		'		Mann	er of Col	llision Propor	tions		
2x	2 intersections	3ST, F+I 3	3ST, PDO	3SG, F+1 3				4SG, F+I 4S	SG, PDO
	collision proportion	0.094	0.154		0.18			0.083	0.148
	ision proportion	0.764	0.629		0.55			0.746	0.552
1x2 ni	1x1 intersections	3ST. F+I :	3ST. PDO	3SG, F+1 3	SG. PD	O 4ST. F+I	4ST. PDO	4SG. F+1 45	G. PDO
	collision proportion	0.100	0.100		0.14		0.065	0.030	0.059
	ision proportion	0.300	0.250		0.57			0.837	0.733
ŭ	dification Factors			F+I			PDO		
	cle crash CMFs						•		
Lighting	olo oragin olvii o			0.911			0.911		
∟ıgııtırIg	omorac								
Dod liabt				1.000			1.000		
Red-light	Same at the face of			0.636			0.636		
Left-turn s	ignal phasing			0.980			0.980		
Left-turn s Right-turn	-on-red						1 000		
Left-turn s	-on-red			1.000			1.000		
Left-turn s Right-turn- U-turn pro	-on-red			1.000 1.000			1.000		
Left-turn s Right-turn- U-turn pro	-on-red hibition channelization								
Left-turn s Right-turn U-turn pro Right-turn Number of	-on-red hibition channelization f lanes			1.000			1.000		
Left-turn s Right-turn U-turn pro Right-turn Number of Vehicle-pe	-on-red hibition channelization	3		1.000 1.128			1.000		
Left-turn s Right-turn U-turn pro Right-turn Number of	-on-red hibition channelization f lanes	s		1.000			1.000		

Safety Pro	ediction Worksheet	<u>for Urban an</u>	d Suburb	an Arterial I	ntersect	<u>tions</u>			
General In	nformation			<u>.</u>	Site Infor	mation			
Analyst	PC			ľ	∕lajor str	eet name	MD 187 (C	old Georgetov	vn Rd)
Agency	ATCS					eet name		Ramp Connec	tor/I-270
Date	1/31/2022			-		ion number	5		
Location	Montgomery County			F	Analysis	year	2045		
Add to	o Totals worksheet		Re	store equation	ns		Re	set input cells	
Output Su	<u>mmary</u>	Predicted c F+I	rash frequ PDO	ency, crashe Total	s / year			Combined C	MF PDO
	Total crashe	s #N/A	#N/A	#N/A		Total-vehi	cle crashes	1.126	1.126
	Total-vehicle crashe		#N/A		Veh	icle-pedestri	an crashes	1.000	
	cle-pedestrian crashe ′ehicle-bicycle crashe	-				•		or F+I crashe	s C
						#N/A	#N/A	#N/A	#N/A
Input Data	='			<u>Value</u>		Advisory N	<u> Messages</u>		
Intersection Area type	ni Dala			Suburban		■.			
Number of	f legs			3		3SG inter	section typ	e	
Traffic con	•			Signalized				-	
Lighting pr				Yes		.			
Red-light of	cameras present?			No					
	estrian volume crossir			52					
	number of lanes cros			6		·			
	f bus stops within 1,0			0 No		·			
. ,	present within 1,000 lles establishments w		on:	No 0		<u>.</u>			
Street Dat	'a			Major I	Лinor				
Street con	figuration			Two-way (One-way	Major stre	et must be	one-way.	
Annual av	erage daily traffic (AA	ADT), veh/day		49223	895			_	
Number of	f through lanes			8		2 Invalid lar	ne count co	mbination.	
	f approaches with left			1		1.			
	f left-turn movements	•				<u>1</u> .			
	f right-turn movement	•	n red	0		0.			
	f U-turn movements p f approaches with rigl		elization	1		0 .			
Calibration				Value		<u> </u>	Default Va	lues	
	oration factor (C)			1.000			1.000		
	nt factor for pedestria	as for stop on	otrol (f)						
			illi (I _{ped})				0.051		
-	nt factor for bicyclists		(0	0.029			0.029		
	istribution calibration			1.000			1.000		
	istribution calibration			1.000			1.000		
Probability	of fatality given K+A	severity (P _K	_{K+A})	0.094			0.094		
2x	2 intersections	3ST. F+I	3ST. PDO			<u>llision Propoi</u> O 4ST, F+I		4SG, F+I 4	SG. PDO
	collision proportion	0.094	0.154		0.18			0.083	0.148
	ision proportion	0.764	0.629		0.55		1	0.746	0.552
1x2 oi	r 1x1 intersections	3ST, F+I	3ST, PDO	3SG, F+1 3	SG, PD	O 4ST, F+I	4ST, PDO	4SG, F+I 4	SG, PDO
	collision proportion	0.100	0.100		0.14			0.030	0.059
	ision proportion	0.300	0.250		0.57	_		0.837	0.733
	dification Factors cle crash CMFs			F+I			PDO		
Lighting				0.911			0.911		
Red-light	cameras			1.000			1.000		
Ū	ignal phasing			0.740			0.740		
Right-turn				1.000			1.000		
ū									
U-turn pro				0.960			0.960		
ū	channelization			1.243			1.243		
Number of	i iailes			1.401			1.401		
Vehicle-no	edestrian crash CME	2							
•	edestrian crash CMFs	3		1.000					
Vehicle-pe Bus stops Schools		3		1.000 1.000					

Safety Prediction Worksheet 1	or Urban an	d Suburb	an Arterial II	ntersect	ions			
General Information				Site Infor	mation			
Analyst PC			_		et name	MD 187 (O	ld Georgetov	vn Rd)
Agency ATCS				•	et name		amp Connec	
Date 1/31/2022			li I	ntersecti	on number	6		
Location Montgomery County			P	nalysis	/ear	2045		
Add to Totals worksheet		Res	store equation	ns		Res	set input cells	
Output Summary	Predicted ci	rash frequ PDO	ency, crashe Total	s / year		_	Combined C F+I	MF PDO
Total crashes		#N/A	#N/A			cle crashes	1.145	1.145
Total-vehicle crashes Vehicle-pedestrian crashes		#N/A]	ven	icle-pedestri	an crasnes	1.000	
Vehicle-bicycle crashes					Severity di	stribution fo	r F+I crashes	5
					#N/A	#N/A	B #N/A	#N/A
Input Data			<u>Value</u>		Advisory N	<u>lessages</u>		
Intersection Data								
Area type			Suburban					
Number of legs			3		3SG inters	section type	е	
Traffic control type			Signalized		ŀ			
Lighting present? Red-light cameras present?			Yes No		<u> </u> •			
Daily pedestrian volume crossin	a all leas (ne	ds/dav)	175		-			
Maximum number of lanes cross	· · · · ·	• ,	6		Ī.			
Number of bus stops within 1,00			0					
School(s) present within 1,000 f		on?	No					
Alcohol sales establishments wi	thin 1,000 ft		0					
Street Data			Major N	<i>linor</i>				
Street configuration			,	ne-way		et must be	one-way.	
Annual average daily traffic (AA	DT), veh/day		56457	6479				
Number of through lanes Number of approaches with left-	turn lance		8		Invalid lar	ie count co	mbination.	
Number of left-turn movements		d nhasing	1		<u> </u>			
Number of right-turn movements	•		0))			
Number of U-turn movements p	rohibited		1		0.			
Number of approaches with righ	t-turn channe	lization	1		1.			
Calibration Factors			<u>Value</u>			Default Val	<u>ues</u>	
Local calibration factor (C)			1.000			1.000		
Adjustment factor for pedestrian	s for stop cor	ntrol (f_{ped})	0.051			0.051		
Adjustment factor for bicyclists (0.029			0.029		
Severity distribution calibration f			1.000			1.000		
Severity distribution calibration f			1.000			1.000		
Probability of fatality given K+A	severity ($P_{\kappa_{\parallel}}$	(+A)	0.094			0.094		
Ov0 interpolations	20T F.1 7	OT 000			ision Propor		400 E.L.4	C BDC
2x2 intersections Rear-end collision proportion	0.094	0.154		0.189			4SG, F+I 45 0.083	0.148
Angle colllision proportion	0.764	0.629	0.676	0.554		0.707	0.746	0.552
1x2 or 1x1 intersections	3ST, F+I 3	ST, PDO	3SG, F+I 3	SG, PDC	0 4ST, F+I	4ST, PDO	4SG, F+I 4S	SG, PDO
Rear-end collision proportion	0.100	0.100	0.111	0.143		0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.57	0.822	0.706	0.837	0.733
Crash Modification Factors			F+I			PDO		
Total-vehicle crash CMFs								
Lighting			0.911			0.911		
Red-light cameras			1.000			1.000		
Left-turn signal phasing			0.740			0.740		
Right-turn-on-red			1.000			1.000		
U-turn prohibition			0.960			0.960		
Right-turn channelization			1.243			1.243		
Number of lanes			1.425			1.425		
Vehicle-pedestrian crash CMFs								
Bus stops			1.000					
Schools			1.000					
Alcohol sales establishments			1.000					

Safety Prediction Worksheet	for Urban an	d Suburb	an Arterial I	ntersec	tions			
General Information			<u> </u>	Site Info	rmation_			
Analyst TL			M	∕lajor str	eet name	MD 355 Ro	ckville Pike	
Agency ATCS			M	∕linor str	eet name	Grosvenor	Ln	
Date 1/31/2022					ion number	1		
Location Montgomery County	/		A	Analysis	year	2045		
Add to Totals worksheet		Re	store equation	ns		Res	set input cells	
Output Summary	Predicted c	rash frequ PDO	ency, crashe Total	s / year			Combined Cl F+I	MF PDO
Total crashe	es 3.544	2.828	6.373		Total-vehi	cle crashes	0.528	0.528
Total-vehicle crashe		2.828		Vel	nicle-pedestr	ian crashes	4.150	
Vehicle-pedestrian crashe Vehicle-bicycle crashe					•		r F+I crashes	С
					0.020		0.987	2.341
Input Data			<u>Value</u>		Advisory I	<u>Messages</u>		
Intersection Data Area type			Suburban					
Number of legs			4		4SG inter	section type	9	
Traffic control type			Signalized					
Lighting present?			Yes					
Red-light cameras present?	na all logo (no	do/dov/)	Yes 156					
Daily pedestrian volume crossi Maximum number of lanes cross			7		•			
Number of bus stops within 1,0			4		- :			
School(s) present within 1,000	ft of intersection	on?	No					
Alcohol sales establishments w	vithin 1,000 ft		0					
Street Data			Major I	<i>Minor</i>				
Street configuration				wo-way		ection conf	iguration	
Annual average daily traffic (A	ADT), veh/day		59822	972				
Number of through lanes	t turn lanca		6		2.			
Number of approaches with lef Number of left-turn movements		d nhasing			2 . 2 .			
Number of right-turn movemen	•		0		0.			
Number of U-turn movements	•		2		0.			
Number of approaches with rig	ht-turn channe	elization	0		2.			
Calibration Factors			<u>Value</u>			<u>Default Val</u>	<u>ues</u>	
Local calibration factor (C)			1.000			1.000		
Adjustment factor for pedestria	ns for stop cor	ntrol (f_{ped})	0.049			0.049		
Adjustment factor for bicyclists			0.019			0.019		
Severity distribution calibration			1.000			1.000		
Severity distribution calibration			1.000			1.000		
Probability of fatality given K+A	severity (P _K	_{K+A})	0.094			0.094		
					Ilision Propo			
2x2 intersections							4SG, F+I 4S	
Rear-end collision proportion Angle colllision proportion	0.094	0.154 0.629		0.18			0.083 0.746	0.148
					- I	1	•	
1x2 or 1x1 intersections Rear-end collision proportion	3ST, F+I 3	3ST, PDO 0.100		0.14 0.14			4SG, F+I 4S 0.030	0.059
Angle collision proportion	0.100	0.100		0.14	_		0.837	0.039
Crash Modification Factors Total-vehicle crash CMFs			F+I			PDO		
Lighting			0.911			0.911		
Red-light cameras			0.850			0.850		
Left-turn signal phasing			0.830			0.830		
Right-turn-on-red			1.000			1.000		
U-turn prohibition			0.922			0.922		
Right-turn channelization			1.000			1.000		
Number of lanes			1.000			1.000		
Vehicle-pedestrian crash CMFs	5					1.000		
Bus stops			4.150					
Schools Alcohol sales establishments			1.000					
Alcohol sales establishments			1.000					

Safety Prediction Worksheet for Two-Way Ur General Information		nformation	
	·	t number MD 355	
Analyst TL Agency ATCS		name Rockville Pike from Grosveno	or I r
Date 1/31/2022		ent number 1	OI LI
Location Montgomery County	•	sis year 2045	
Add to Totals worksheet	Restore equations	Reset input cells	
Output Summary Predicted crass	h frequency, crashes / ye	ear Combined CMF	
F+1	PDO Total		PDO
Total crashes 1.155	1.515 2.670		.204
Multiple-vehicle crashes 0.775 Single-vehicle crashes 0.320	1.117 0.398	Single-vehicle crashes 0.840 0.	.840
Vehicle-pedestrian crashes 0.039	0.390	Severity distribution for F+I crashes	
Vehicle-bicycle crashes 0.021		K A B	С
			.692
Input Data	<u>Value</u>	Advisory Messages	
Basic Roadway Data			
Area type	Suburban	•	
Segment type Segment length, mi	6D 0.46	•	
Annual average daily traffic (AADT), veh/day	61335	•	
Number of highway-rail grade crossings present		•	
Posted speed limit, mi/h	40		
Automated speed enforcement present?	No	:	
Access Data			
Driveway count Major commercial	0		
Major industrial	0		
Minor	1	2 minor driveways per mile.	
Cross Section Data			
Lane width, ft	12		
Outside shoulder width, ft	2		
Median width, ft	180		
Median barrier present?	Yes	•	
Roadside Data			
Roadside fixed object count	11	24 objects per mile.	
Average roadside fixed object offset, ft	6	. Default Values	
Calibration Factors	<u>Value</u>	Default Values	
Local calibration factor (C)	1.000	1.000	
Adjustment factor for pedestrians (f_{ped})	0.015	0.015	
Adjustment factor for bicyclists (f_{bike}) Severity distribution calibration factor ($C_{sdf,tws}$)	0.008	0.008	
Crash Modification Factors	1.000 F+I	1.000 PDO	
Grasii Modineatiori Factors	Multiple Single		
Lane width		.000 1.000 1.000	
Outside shoulder width		.986 0.986 0.986	
Median width		0.390 0.390	
Median barrier		.967 0.600 1.967	
Highway-rail grade crossing Major commercial driveways	1.000 1 0.932	.000 1.000 1.000 0.932	
Major industrial driveways	0.989	0.989	
Minor driveways	0.959	0.959	
		.000 1.000 1.000	
Automated speed enforcement	1.0001	.000 1.000 1.000	

Safety Prediction Worksheet	for Urban an	d Suburb	an Arterial I	ntersec	tions			
General Information				Site Infor				
Analyst TL			_		eet name	MD 355 Ro	ckville Pike	
Agency ATCS				•	eet name	Pooks Hill F		
Date 1/31/2022			I	ntersecti	ion number	2		
Location Montgomery County	1		A	Analysis	year	2045		
Add to Totals worksheet		Res	store equation	ns		Res	set input cells	
Output Summary	Predicted c	rash frequ PDO	ency, crashe Total	s / year			Combined C	MF PDO
Total crashe		2.757				cle crashes	0.634	0.634
Total-vehicle crashe		2.757		Veh	icle-pedestr	an crashes	4.150	
Vehicle-pedestrian crashe Vehicle-bicycle crashe					Severity d	istribution fo	r F+I crashes	
volucio bioyolo olucilo	0.170				K		В	C
					0.019	0.188	0.945	2.328
<u>Input Data</u>			<u>Value</u>		Advisory I	<u>Messages</u>		
Intersection Data					_			
Area type			Suburban		200 inter	cootion to	•	
Number of legs Traffic control type			3 Signalized		Jou inter	section type	U	
Lighting present?			Yes		- :			
Red-light cameras present?			No		_ .			
Daily pedestrian volume crossin	· · ·	• ,	78					
Maximum number of lanes cros Number of bus stops within 1,00			9 5					
School(s) present within 1,000 f			No		:			
Alcohol sales establishments w		•	0					
Street Data			Major I	<i>Minor</i>				
Street configuration			Two-way 1	wo-way	2x2 inters	ection conf	figuration	
Annual average daily traffic (AA	NDT), veh/day		72165	951				
Number of through lanes	turn lance		6		2.			
Number of approaches with left Number of left-turn movements		d nhasing			<u>'</u> ∙ <mark>1</mark> .			
Number of right-turn movement	•		1		0.			
Number of U-turn movements p			1		0.			
Number of approaches with righ	nt-turn channe	elization	0		1.			
Calibration Factors			<u>Value</u>			<u>Default Val</u>	<u>ues</u>	
Local calibration factor (C)			1.000			1.000		
Adjustment factor for pedestriar		ntrol (f _{ped})	0.051			0.051		
Adjustment factor for bicyclists			0.029			0.029		
Severity distribution calibration			1.000			1.000		
Severity distribution calibration			1.000			1.000		
Probability of fatality given K+A	severity ($P_{K }$	K+A)	0.094			0.094		
2x2 intersections	39T E±1	39T DDA			llision Propo O 4ST E+I		4SG, F+I 45	SG PDO
Rear-end collision proportion	0.094	0.154		0.18			0.083	0.148
Angle colllision proportion	0.764	0.629		0.55			0.746	0.552
1x2 or 1x1 intersections	3ST, F+I					4ST, PDO	4SG, F+I_4S	SG, PDO
Rear-end collision proportion	0.100	0.100		0.14			0.030	0.059
Angle colllision proportion	0.300	0.250		0.57	0.822		0.837	0.733
Crash Modification Factors			F+I			PDO		
Total-vehicle crash CMFs			0.01.1			6.04.		
Lighting			0.911			0.911		
Red-light cameras			1.000			1.000		
Left-turn signal phasing			0.740			0.740		
Right-turn-on-red			0.980			0.980		
U-turn prohibition			0.960			0.960		
Right-turn channelization Number of lanes			1.000			1.000		
Vehicle-pedestrian crash CMFs	•					1.000		
Bus stops	•		4.150					
Schools			1.000					
Alcohol sales establishments			1.000					

General Information	Site II	nformation_	
Analyst TL	Stree	t number	MD 355
Agency ATCS	Stree	t name	Rockville Pike from Pooks Hill Ro
Date 1/31/2022	•	ent number	2
Location Montgomery County	Analy	sis year	2045
Add to Totals worksheet	Restore equations		Reset input cells
Output Summary Predicted cras	sh frequency, crashes / ye	ear	Combined CMF
F+/	PDO Total		F+I PDO
Total crashes 0.716 Multiple-vehicle crashes 0.615	0.940 1.656 0.861		hicle crashes 1.020 1.020 hicle crashes 1.191 1.191
Multiple-vehicle crashes 0.615 Single-vehicle crashes 0.064	0.079	Single-vei	nicle crashes 1.191 1.191
Vehicle-pedestrian crashes 0.004	0.079	Severity	distribution for F+I crashes
Vehicle-bicycle crashes 0.013		=	K A B C
		0.00	
<u>Input Data</u>	<u>Value</u>	<u>Advisory</u>	Messages
Basic Roadway Data			
Area type	Suburban		
Segment type	6D	•	
Segment length, mi	0.06	•	
Annual average daily traffic (AADT), veh/day Number of highway-rail grade crossings presen	71893 t	•	
Posted speed limit, mi/h	35	•	
Automated speed enforcement present?	No		
Access Data			
Driveway count Major commercial	0		
Major industrial	0		
Minor	1	17 mino	r driveways per mile.
Cross Section Data			
Lane width, ft	11		
Outside shoulder width, ft	0		
Median width, ft	15		
Median barrier present?	No	•	
Roadside Data			
Roadside fixed object count	2	33 objed	cts per mile.
Average roadside fixed object offset, ft	8	•	
Calibration Factors	<u>Value</u>		<u>Default Values</u>
Local calibration factor (C)	1.000		1.000
Adjustment factor for pedestrians (f_{ped})	0.015		0.015
Adjustment factor for bicyclists (f_{bike})	0.008		0.008
Severity distribution calibration factor ($C_{sdf,tws}$)	1.000		1.000
Crash Modification Factors	F+1		PDO Multiple Single
Lane width	Multiple Single 1.022 1	.022	Multiple Single 1.022 1.022
Outside shoulder width		.044	1.044 1.044
Median width		.000	1.000 1.000
Median barrier		.000	1.000 1.000
Highway-rail grade crossing		.000	1.000 1.000
Major commercial driveways	0.932		0.932
Major industrial driveways	0.989		0.989
Minor driveways	1.037		1.037
Automated speed enforcement		.000	1.000 1.000
Roadside fixed objects		.117	1.117

Safety Prediction Worksheet	for Urban and	d Suburb	an Arterial I	ntersec	tions			
General Information				Site Info	rmation_			
Analyst TL			1	Major str	reet name	MD 355 Rd	ckville Pike	
Agency ATCS			I	Minor str	reet name	Bellevue D	r/Alta Vista R	d
Date 1/31/2022					tion number	3		
Location Montgomery County	/		,	Analysis	year	2045		
Add to Totals worksheet		Re	store equatio	ns		Re	set input cells	
Output Summary	Predicted cr F+I	rash frequ PDO	ency, crashe Total	es / year	•		Combined Cl F+I	MF PDO
Total crashe	0.000	2.917	6.482		Total-vehi	cle crashes	0.911	0.911
Total-vehicle crashe		2.917		Vel	nicle-pedestr	ian crashes	4.150	
Vehicle-pedestrian crashe Vehicle-bicycle crashe					Severity d K		r F+I crashes	C
					0.020		0.942	2.415
Input Data Intersection Data			<u>Value</u>		Advisory I	<u>Messages</u>		
Area type			Suburban		<u> </u>			
Number of legs			4		4SG inter	section typ	е	
Traffic control type			Signalized					
Lighting present? Red-light cameras present?			Yes No					
Daily pedestrian volume crossi	ng all legs (ne	ds/day)	77		-			
Maximum number of lanes cros	0 (,	7		- :			
Number of bus stops within 1,0			6					
School(s) present within 1,000		on?	No					
Alcohol sales establishments w	vithin 1,000 ft		0					
Street Data			Major I	Minor				
Street configuration				Two-way		section conf	figuration	
Annual average daily traffic (AA	ADT), veh/day		67704	127				
Number of through lanes Number of approaches with left	t-turn lanes		2		2 0			
Number of left-turn movements		d phasing			0.			
Number of right-turn movement	ts prohibited o	n red	0		0.			
Number of U-turn movements p			0		0.			
Number of approaches with rig	ht-turn channe	elization	0		0			
Calibration Factors			<u>Value</u>			<u>Default Val</u>	<u>ues</u>	
Local calibration factor (C)			1.000			1.000		
Adjustment factor for pedestria		ntrol (f _{ped})				0.049		
Adjustment factor for bicyclists	,		0.019			0.019		
Severity distribution calibration			1.000			1.000		
Severity distribution calibration			1.000			1.000		
Probability of fatality given K+A	severity (P _K	(+A)	0.094			0.094		
					Ilision Propo			
2x2 intersections							4SG, F+I 4S	
Rear-end collision proportion Angle colllision proportion	0.094	0.154 0.629		0.18			0.083 0.746	0.148 0.552
							•	
1x2 or 1x1 intersections Rear-end collision proportion	0.100	0.100		0.14 0.14			4SG, F+I 4S 0.030	0.059
Angle collision proportion	0.300	0.100		0.12			0.837	0.733
<u>Crash Modification Factors</u> Total-vehicle crash CMFs			F+I		1	PDO	•	<u>'</u>
Lighting			0.911			0.911		
Red-light cameras			1.000			1.000		
Left-turn signal phasing			1.000			1.000		
Right-turn-on-red			1.000			1.000		
U-turn prohibition			1.000			1.000		
Right-turn channelization			1.000			1.000		
Number of lanes			1.000			1.000		
Vehicle-pedestrian crash CMFs	5		1.555			1.000		
Bus stops			4.150					
Schools			1.000					
Alcohol sales establishments			1.000					

Safety Prediction Worksheet	for Urban an	d Suburb	an Arterial I	ntersect	ions			
General Information				Site Infor	<u>mation</u>			
Analyst TL				/laior str	eet name	Sam Eig Hv	VV	
Agency ATCS				•	eet name		eat Senecca	Hwy
Date 1/31/2022			I	ntersecti	on number	1		
Location Montgomery County			A	nalysis	year	2045		
Add to Totals worksheet		Res	store equation	ns		Res	et input cells	
Output Summary	Predicted of F+I	rash frequ PDO	ency, crashe Total	s / year		(Combined Cl F+I	MF PDO
Total crashe		2.942				cle crashes	0.767	0.767
Total-vehicle crashe		2.942		Veh	icle-pedestri	an crashes	1.000	
Vehicle-pedestrian crashe Vehicle-bicycle crashe					Severity d	istribution for	F+I crashes	,
vernole-bloyele drashe	3 0.177				K		B B	C
					0.019		0.910	2.243
Input Data			<u>Value</u>		Advisory N	<u> Messages</u>		
Intersection Data					_			
Area type			Suburban			nootles to		
Number of legs Traffic control type			3 Signalized		35G inter	section type	;	
Lighting present?			Yes		∃ :			
Red-light cameras present?			No					
Daily pedestrian volume crossir	· · ·	• ,	67		_ .			
Maximum number of lanes cros			7					
Number of bus stops within 1,00 School(s) present within 1,000 f			0 No					
Alcohol sales establishments w		OII:	0		<u>.</u>			
0, 15,1					_			
Street Data			-,-	⁄linor	<u>.</u>			
Street configuration	DT)		,	wo-way		ection conf	•	
Annual average daily traffic (AA Number of through lanes	ו טו), ven/day		38841		U Cneck mi 4	nor volume.		
Number of approaches with left	-turn lanes		1		1			
Number of left-turn movements		d phasing	1		1.			
Number of right-turn movement	s prohibited o	n red	0		1.			
Number of U-turn movements p		. !! 4!	0		0.			
Number of approaches with righ	nt-turn channe	elization	_		<u> </u>	D - f # \ / - !-		
<u>Calibration Factors</u>			<u>Value</u>			<u>Default Valu</u>	<u>ies</u>	
Local calibration factor (C)			1.000			1.000		
Adjustment factor for pedestriar		ntrol († _{ped})	0.051			0.051		
Adjustment factor for bicyclists		<i>(</i> 2	0.029			0.029		
Severity distribution calibration			1.000			1.000		
Severity distribution calibration			1.000			1.000		
Probability of fatality given K+A	seventy (P _K	K+A)	0.094	e =		0.094		
2x2 intersections	3ST F+I	3ST PDO	<u>Mann</u> 3SG, F+I 3		<u>lision Propol</u> O 4ST F+I		4SG F+1 49	SG PDO
Rear-end collision proportion	0.094	0.154	0.120	0.18	9 0.079	0.098	0.083	0.148
Angle colllision proportion	0.764	0.629	0.676	0.55	4 0.806	0.707	0.746	0.552
1x2 or 1x1 intersections			3SG, F+1 3					
Rear-end collision proportion	0.100	0.100	0.111	0.14		0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.57	1 0.822		0.837	0.733
Crash Modification Factors			F+I			PDO		
Total-vehicle crash CMFs			0.011			0011		
Lighting			0.911			0.911		
Red-light cameras			1.000			1.000		
Left-turn signal phasing			0.740			0.740		
Right-turn-on-red			0.980			0.980		
U-turn prohibition			0.960			0.960		
Right-turn channelization			1.000			1.000		
Number of lanes			1.210			1.210		
Vehicle-pedestrian crash CMFs	;		4.000					
Bus stops Schools			1.000					
Alcohol sales establishments			1.000					
			500					

General Information	<u>Site In</u>	formation_
Analyst TL	Street	number I-370
Agency ATCS	Street	
Date 1/31/2022	Segme	ent number 1
Location Montgomery County	Analys	sis year 2045
Add to Totals worksheet	Restore equations	Reset input cells
Output Summary Predicted cra	ash frequency, crashes / ye	ar Combined CMF
<u>F+I</u>	PDO Total	<u> F+I PD0</u>
Total crashes 1.298	1.779 3.077	Multiple-vehicle crashes 0.517 0.51
Multiple-vehicle crashes 0.755	1.181	Single-vehicle crashes 2.273 2.27
Single-vehicle crashes 0.474	0.598	
Vehicle-pedestrian crashes 0.045		Severity distribution for F+I crashes
Vehicle-bicycle crashes 0.024		K A B 0
Input Data	Value	Advisory Messages
Basic Roadway Data	<u></u>	
Area type	Suburban	
Segment type	6D	
Segment length, mi	0.31	
Annual average daily traffic (AADT), veh/day	39049	
Number of highway-rail grade crossings prese		
Posted speed limit, mi/h	50	
Automated speed enforcement present?	No	
Access Data		
Driveway count Major commercial	0	
Major industrial	0	
Minor	0	:
Cross Section Data		
Lane width, ft	12	
Outside shoulder width, ft	1	
Median width, ft	20	
Median barrier present?	Yes	
Roadside Data		
Roadside fixed object count	9	29 objects per mile.
Average roadside fixed object offset, ft	4	
Calibration Factors	<u>Value</u>	Default Values
Local calibration factor (C)	1.000	1.000
Adjustment factor for pedestrians (f_{ped})	0.015	0.015
Adjustment factor for bicyclists (f _{bike})	0.008	0.008
Severity distribution calibration factor ($C_{sdf,tws}$)		1.000
Crash Modification Factors	F+I	PDO
	Multiple Single	
Lane width		000 1.000 1.000
Outside shoulder width		014 1.014 1.014
Median width		972 0.972 0.972
Median barrier		967 0.600 1.967
Highway-rail grade crossing		000 1.000 1.000
Major commercial driveways	0.932	0.932
Major industrial driveways	0.989	0.989
Minor driveways	0.947	0.947
Automated speed enforcement	1.000 1.	1.000 1.000
Roadside fixed objects		172 1.172

Analyst TI	<u>nformation</u>
Analyst TL Major	street name Sam Eig Hwy
	street name Diamondback Dr
	ection number 2
Location Montgomery County Analysis	sis year 2045
Add to Totals worksheet Restore equations	Reset input cells
Output Summary Predicted crash frequency, crashes / ye F+I PDO Total	ear Combined CMF F+I PDO
Total crashes 6.352 5.362 11.714	Total-vehicle crashes 0.935 0.935
	Vehicle-pedestrian crashes 4.150
Vehicle-pedestrian crashes 0.266 Vehicle-bicycle crashes 0.213	Severity distribution for F+I crashes K A B C
	0.028 0.265 1.537 4.522
Input Data Intersection Data	Advisory Messages
Area type Suburban	<u> </u>
Number of legs 4	4SG intersection type
Traffic control type Signalized	
Lighting present?	
Red-light cameras present? Daily pedestrian volume crossing all legs (peds/day) 151	·
Maximum number of lanes crossed by a pedestrian 8	
Number of bus stops within 1,000 ft of intersection 3	
School(s) present within 1,000 ft of intersection?	
Alcohol sales establishments within 1,000 ft	
Street Data Major Minor	•
Street configuration Two-way Two-v	
	9215
Number of through lanes Number of approaches with left-turn lanes 2	4.
Number of approaches with left-turn lanes Number of left-turn movements with protected phasing 2	1.
Number of right-turn movements prohibited on red 0	1
Number of U-turn movements prohibited 2	0.
Number of approaches with right-turn channelization 2	1.
<u>Calibration Factors</u> <u>Value</u>	<u>Default Values</u>
Local calibration factor (C) 1.000	1.000
Adjustment factor for pedestrians for stop control (f_{ped}) 0.049	0.049
Adjustment factor for bicyclists (f_{bike}) 0.019	0.019
Severity distribution calibration factor, 2-way (C _{sdf,twi}) 1.000	1.000
Severity distribution calibration factor, 1-way (C sdf,owi) 1.000	1.000
Probability of fatality given K+A severity (P _{K K+A}) 0.094	0.094
<u>Manner of</u>	Collision Proportions
2x2 intersections 3ST, F+I 3ST, PDO 3SG, F+I 3SG, I	PDO 4ST, F+I 4ST, PDO 4SG, F+I 4SG, PDO
	0.189 0.079 0.098 0.083 0.148
	0.554 0.806 0.707 0.746 0.552
	PDO 4ST, F+I 4ST, PDO 4SG, F+I 4SG, PDO
	.143 0.047 0.065 0.030 0.059 .571 0.822 0.706 0.837 0.733
Crash Modification Factors F+I	PDO
Total-vehicle crash CMFs	0.044
Lighting 0.911	0.911
Red-light cameras 1.000	1.000
Left-turn signal phasing 0.636	0.636
Right-turn-on-red 0.980	0.980
U-turn prohibition 0.922	0.922
	1.545
Right-turn channelization 1.545	1.157
Number of lanes 1.157	1.107
Number of lanes 1.157 Vehicle-pedestrian crash CMFs	1.107
Number of lanes 1.157	1.107

General Information	Site In	<u>formation</u>	
Analyst TL	Street	number I-370	
Agency ATCS	Street	name Sam Eig Hwy from Diamo	ondback
Date 1/31/2022	Segme	ent number 2	
Location Montgomery County	Analys	is year 2045	
Add to Totals worksheet	Restore equations	Reset input cells	
Output Summary Predicted cra	sh frequency, crashes / ye	ar Combined CM	1F
F+I	PDO Total	F+I	PDO
Total crashes 0.273	0.374 0.647	Multiple-vehicle crashes 0.557	0.557
Multiple-vehicle crashes 0.156	0.244	Single-vehicle crashes 2.564	2.564
Single-vehicle crashes 0.103 Vehicle-pedestrian crashes 0.009	0.130	Severity distribution for F+I crashes	
Vehicle-bicycle crashes 0.005		K A B	С
vermore proyers ordernes		0.006 0.021 0.083	0.162
Input Data	<u>Value</u>	Advisory Messages	
Basic Roadway Data			
Area type	Suburban	•	
Segment type	6D	•	
Segment length, mi	0.06	•	
Annual average daily traffic (AADT), veh/day Number of highway-rail grade crossings preser	38714 ort 0	•	
Posted speed limit, mi/h	50	•	
Automated speed enforcement present?	No		
Access Data			
Driveway count Major commercial	0		
Major industrial	0		
Minor	0	•	
Cross Section Data			
Lane width, ft	12		
Outside shoulder width, ft	1		
Median width, ft	7		
Median barrier present?	Yes		
Roadside Data			
Roadside fixed object count	3	50 objects per mile.	
Average roadside fixed object offset, ft	6		
Calibration Factors	<u>Value</u>	<u>Default Values</u>	
Local calibration factor (C)	1.000	1.000	
Adjustment factor for pedestrians (f_{ped})	0.015	0.015	
Adjustment factor for bicyclists (f_{bike})	0.008	0.008	
Severity distribution calibration factor ($C_{sdf,tws}$)	1.000	1.000	
Crash Modification Factors	F+I Multiple Single	PDO Multiple Single	
Lane width		000 1.000 1.000	
Outside shoulder width		014 1.014 1.014	
Median width		047 1.047 1.047	
Median barrier		967 0.600 1.967	
Highway-rail grade crossing		000 1.000 1.000	
Major commercial driveways	0.932	0.932	
Major industrial driveways	0.989	0.989	
Minor driveways	0.947	0.947	
	0.947 1.000 1.	0.947 000 1.000 1.000 228 1.228	

Safety Prediction Worksheet	for Urban an	d Suburb	an Arterial I	ntersecti	ons			
General Information	-			Site Inform				
Analyst TL			_	∕/ajor stre		Sam Eig H	WV	
Agency ATCS				∕linor stre		Fields Rd	··· <i>y</i>	
Date 1/31/2022			-		n number	3		
Location Montgomery County	1		A	Analysis y	ear	2045		
Add to Totals worksheet		Res	store equation	ns		Re	set input cells	
Output Summary	Predicted c	rash frequ PDO	ency, crashe Total	s/year			Combined C F+I	MF PDO
Total crashe		3.049			Total-vehic	cle crashes	0.856	0.856
Total-vehicle crashe	s 3.231	3.049		Vehi	cle-pedestri	an crashes	3.114	
Vehicle-pedestrian crashe	-							
Vehicle-bicycle crashe	s 0.182				Severity di K	_	r F+I crashes B	C
					0.020	A 0.191	0.962	2.370
Input Data			<u>Value</u>		Advisory N	<u>lessages</u>		
Intersection Data Area type			Suburban		1			
Number of legs			3		3SG interes	section type	e	
Traffic control type			Signalized			- Jones Cyp	-	
Lighting present?			Yes].			
Red-light cameras present?			No		ŀ			
Daily pedestrian volume crossii		• ,	151		ŀ			
Maximum number of lanes cross Number of bus stops within 1,0			11		<u> </u>			
School(s) present within 1,000			No		i.			
Alcohol sales establishments w			1		<u></u>			
Street Data			Major I	Minor				
Street configuration				wo-way		ection con	figuration	
Annual average daily traffic (AA	ADT), veh/day		38611	18696	-			
Number of through lanes Number of approaches with left	turn lanes		6	4	<u> </u>			
Number of left-turn movements		d phasing	1	1	i.			
Number of right-turn movement	•		1	1				
Number of U-turn movements p			1	1] .			
Number of approaches with rig	ht-turn channe	elization	1	1				
Calibration Factors			<u>Value</u>			<u>Default Val</u>	<u>ues</u>	
Local calibration factor (C)			1.000			1.000		
Adjustment factor for pedestria	ns for stop co	ntrol (f_{ped})	0.051			0.051		
Adjustment factor for bicyclists			0.029			0.029		
Severity distribution calibration			1.000			1.000		
Severity distribution calibration			1.000			1.000		
Probability of fatality given K+A	severity (P _K	_{K+A})	0.094			0.094		
					ision Propor			
2x2 intersections							4SG, F+I 4S	
Rear-end collision proportion Angle colllision proportion	0.094	0.154 0.629	0.120 0.676	0.189			0.083 0.746	0.148 0.552
1x2 or 1x1 intersections							4SG, F+I 4S	
Rear-end collision proportion	0.100	0.100	0.111	0.143		0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.571			0.837	0.733
Crash Modification Factors			F+I			PDO		
Total-vehicle crash CMFs						-		
Lighting			0.911			0.911		
Red-light cameras			1.000			1.000		
Left-turn signal phasing			0.740			0.740		
Right-turn-on-red			0.960			0.960		
U-turn prohibition			0.922			0.922		
•			1.243			1.243		
Right-turn channelization								
Right-turn channelization Number of lanes			1.155			1.155		
Number of lanes	s		1.155			1.155		
•	5		2.780			1.155		
Number of lanes Vehicle-pedestrian crash CMFs	5					1.155		

Safety Prediction Worksheet	for Urban an	d Suburb	an Arterial li	ntersect	ions			
General Information			<u>S</u>	ite Infor	<u>mation</u>			
Analyst TL			N	laior str	eet name	Shady Grov	ve Rd	
Agency ATCS				•	eet name	Corporate E		
Date 1/31/2022			li	ntersecti	on number	1		
Location Montgomery County			A	nalysis	year	2045		
Add to Totals worksheet		Res	store equatior	ns		Res	set input cells	
Output Summary	Predicted c F+I	rash frequ PDO	ency, crashe Total	s / year			Combined Ci F+I	MF PDO
Total crashe		2.804				cle crashes	0.674	0.674
Total-vehicle crashe		2.804		Veh	icle-pedestri	an crashes	4.648	
Vehicle-pedestrian crashe Vehicle-bicycle crashe					Severity d	istribution fo	r F+I crashes	
vernete-bicycle drasne.	3 0.112				K	A	В	C
					0.019		0.897	2.298
Input Data			<u>Value</u>		Advisory N	<u>lessages</u>		
Intersection Data			0 1 .		_			
Area type			Suburban		100 :	nostlan ta	_	
Number of legs Traffic control type			4 Signalized		45G inter	section type	e	
Lighting present?			Yes		† :			
Red-light cameras present?			No					
Daily pedestrian volume crossin			161					
Maximum number of lanes cros	, ,		7					
Number of bus stops within 1,00 School(s) present within 1,000 f			4 No					
Alcohol sales establishments wi		OII!	1		<u>.</u>			
Street Data			Major N	<i>linor</i>				
Street configuration			Two-way T	wo-way	2x2 inters	ection conf	figuration	
Annual average daily traffic (AA	DT), veh/day		41241	552			•	
Number of through lanes			6		2 .			
Number of approaches with left			2		1.			
Number of left-turn movements Number of right-turn movement	•		0		2 . 0 .			
Number of U-turn movements p	•	nneu	0		0.			
Number of approaches with righ		elization	0		0			
Calibration Factors			Value			Default Val	<u>ues</u>	
Local calibration factor (C)			1.000			1.000		
Adjustment factor for pedestriar	ns for stop co	ntrol (f ped)	0.049			0.049		
Adjustment factor for bicyclists ((pod)	0.019			0.019		
Severity distribution calibration		(C _{sdf,twi})	1.000			1.000		
Severity distribution calibration			1.000			1.000		
Probability of fatality given K+A			0.094			0.094		
					lision Propor			
2x2 intersections Rear-end collision proportion			3SG, F+I 3					
Angle collision proportion	0.094 0.764	0.154 0.629		0.18 0.55			0.083 0.746	0.148 0.552
1x2 or 1x1 intersections	3ST. F+I		3SG, F+1 3				4SG. F+1 45	
Rear-end collision proportion	0.100	0.100	0.111	0.14	0.047	0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.57	1 0.822	0.706	0.837	0.733
Crash Modification Factors			F+I			PDO		
Total-vehicle crash CMFs								
Lighting			0.911			0.911		
Red-light cameras			1.000			1.000		
Left-turn signal phasing			0.740			0.740		
Right-turn-on-red			1.000			1.000		
U-turn prohibition			1.000			1.000		
Right-turn channelization Number of lanes			1.000			1.000		
			1.000			1.000		
Vehicle-pedestrian crash CMFs Bus stops	i		4.150					
Schools			1.000					
Alcohol sales establishments			1.120					

General Information	Site I	nformation	
Analyst TL	· · · · · · · · · · · · · · · · · · ·	t number Shady Grove Rd	
Agency ATCS		t name Corporate Blvd to I-270 SB R	Rami
Date 1/31/2022		nent number 1	
Location Montgomery County	•	sis year 2045	
Add to Totals worksheet	Restore equations	Reset input cells	
Output Summary Predicted crash	frequency, crashes / ye	ear Combined CMF	
F+1	PDO Total		DO.
Total crashes 0.271	0.368 0.639		.514
·	0.240	Single-vehicle crashes 2.446 2.	.446
Single-vehicle crashes 0.101 Vehicle-pedestrian crashes 0.009	0.128	Soverity distribution for Et Laroches	
Vehicle-pedestrian crashes 0.009 Vehicle-bicycle crashes 0.005		Severity distribution for F+I crashes K A B	С
verlicle-bicycle crashes 0.005			.162
Input Data	<u>Value</u>	Advisory Messages	
Basic Roadway Data			
Area type	Suburban	•	
Segment type	6D	•	
Segment length, mi	0.06	•	
Annual average daily traffic (AADT), veh/day	41219	•	
Number of highway-rail grade crossings present Posted speed limit, mi/h	40	•	
Automated speed enforcement present?	No.		
·		•	
Access Data			
Driveway count Major commercial	0	•	
Major industrial Minor	0		
Cross Section Data			
Lane width, ft	11		
Outside shoulder width, ft	3	•	
Median width, ft	15	•	
Median barrier present?	Yes	:	
Roadside Data			
Roadside fixed object count	6	100 objects per mile.	
Average roadside fixed object offset, ft	10		
Calibration Factors	<u>Value</u>	<u>Default Values</u>	
Local calibration factor (C)	1.000	1.000	
Adjustment factor for pedestrians (f_{ped})	0.015	0.015	
Adjustment factor for bicyclists (f_{bike})	0.008	0.008	
Severity distribution calibration factor ($C_{sdf,tws}$)	1.000	1.000	
Crash Modification Factors	F+1	PDO	
Lane width	Multiple Single 1.022		
Outside shoulder width		.022 1.022 1.022 0.958 0.958 0.958	
Median width		.000 1.000 1.000	
Median barrier		.967 0.600 1.967	
Highway-rail grade crossing		.000 1.000 1.000	
Major commercial driveways	0.932	0.932	
Major industrial driveways	0.989	0.989	
Minor driveways	0.947	0.947	
Automated speed enforcement		.000 1.000 1.000	
Roadside fixed objects		.270	

General Information	<u>Site</u>	<u>Information</u>	
Analyst TL	Stree	et number	Shady Grove Rd
Agency ATCS	Stree	et name	I-270 SB Ramps to I-270 NB Ra
Date 1/31/2022	•	nent number	2
Location Montgomery County	Anal	ysis year	2045
Add to Totals worksheet	Restore equations		Reset input cells
Output Summary Predicted cras	h frequency, crashes / y	<i>rear</i>	Combined CMF
F+I	PDO Total		F+I PDO
Total crashes 0.362	0.492 0.854		hicle crashes 0.514 0.514
Multiple-vehicle crashes 0.212 Single-vehicle crashes 0.131	0.327 0.165	Single-ve	hicle crashes 2.357 2.357
Vehicle-pedestrian crashes 0.013	0.103	Severity	distribution for F+I crashes
Vehicle-bicycle crashes 0.007		-	K A B C
		0.00	
Input Data	<u>Value</u>	<u>Advisory</u>	<u>/ Messages</u>
Basic Roadway Data			
Area type	Suburban		
Segment type	6D	•	
Segment length, mi	0.08	•	
Annual average daily traffic (AADT), veh/day Number of highway-rail grade crossings present	41969	•	
Posted speed limit, mi/h	40	•	
Automated speed enforcement present?	No		
Access Data			
Driveway count Major commercial	0		
Major industrial	0		
Minor	0		
Cross Section Data			
Lane width, ft	12		
Outside shoulder width, ft	4		
Median width, ft	6		
Median barrier present?	Yes	•	
Roadside Data			
Roadside fixed object count	3	38 objec	cts per mile.
Average roadside fixed object offset, ft	4	•	D. C. W.V. I
Calibration Factors	<u>Value</u>		<u>Default Values</u>
Local calibration factor (C)	1.000		1.000
Adjustment factor for pedestrians (f _{ped})	0.015		0.015
Adjustment factor for bicyclists (f _{bike})	0.008		0.008
Severity distribution calibration factor ($C_{sdf,tws}$)	1.000		1.000
Crash Modification Factors	F+I Multiple Sing	lo.	PDO Multiple Single
Lane width	Multiple Sing.	1.000	Multiple Single 1.000 1.000
Outside shoulder width		0.931	0.931 0.931
Median width		1.053	1.053 1.053
Median barrier		1.967	0.600 1.967
Highway-rail grade crossing		1.000	1.000 1.000
Major commercial driveways	0.932		0.932
Major industrial driveways	0.989		0.989
Min an aluis casses ca	0.947		0.947
Minor driveways Automated speed enforcement		1.000	1.000 1.000

General Information	Site i	Information_
Analyst TL	·	et number Shady Grove Rd
Agency ATCS		et name I-270 NB Ramps to Choke Che
Date 1/31/2022	Segr	ment number 3
Location Montgomery County	Analy	ysis year 2045
Add to Totals worksheet	Restore equations	Reset input cells
	sh frequency, crashes / y	
F+/	PDO Total	F+I PDC
Total crashes 0.670	0.918 1.589	Multiple-vehicle crashes 0.731 0.73
Multiple-vehicle crashes 0.447 Single-vehicle crashes 0.188	0.682 0.236	Single-vehicle crashes 2.387 2.38
Vehicle-pedestrian crashes 0.023	0.230	Severity distribution for F+I crashes
Vehicle-bicycle crashes 0.012		K A B
		0.010 0.053 0.206 0.40
Input Data	<u>Value</u>	Advisory Messages
Basic Roadway Data		
Area type	Suburban	•
Segment type Segment length, mi	6D 0.11	•
Annual average daily traffic (AADT), veh/day	44601	•
Number of highway-rail grade crossings presen		•
Posted speed limit, mi/h	40	•
Automated speed enforcement present?	No	:
Access Data		
Driveway count Major commercial	1	9 major comm. driveways per mile.
Major industrial	0	
Minor	0	•
Cross Section Data		
Lane width, ft	12	
Outside shoulder width, ft	1	
Median width, ft	15	
Median barrier present?	Yes	•
Roadside Data		
Roadside fixed object count	8	73 objects per mile.
Average roadside fixed object offset, ft	10	
<u>Calibration Factors</u>	<u>Value</u>	Default Values
Local calibration factor (C)	1.000	1.000
Adjustment factor for pedestrians (f_{ped})	0.015	0.015
Adjustment factor for bicyclists (f _{bike})	0.008	0.008
Severity distribution calibration factor ($C_{sdf,tws}$)	1.000	1.000
Crash Modification Factors	F+I Multiple Singl	PDO le Multiple Single
Lane width		1.000 1.000 1.000
Outside shoulder width		1.014 1.014
Median width		1.000 1.000
Median barrier		1.967 0.600 1.967
Highway-rail grade crossing		1.000 1.000
Major commercial driveways	1.282	1.282
Major industrial driveways	0.989	0.989
Minor driveways	0.947	0.947
Automated speed enforcement		1.000 1.000
Roadside fixed objects		1.196

Safety Prediction Worksheet	for Urban and	d Suburb	an Arterial I	ntersec	tions			
General Information			<u> </u>	Site Info	rmation_			
Analyst TL			1	∕lajor str	reet name	Shady Grov	/e Rd	
Agency ATCS			ı	∕linor str	reet name	Choke Che	rry Rd	
Date 1/31/2022			I	ntersect	tion number	2		
Location Montgomery Count	/		,	Analysis	year	2045		
Add to Totals worksheet		Re	store equatio	ns		Res	set input cells	
Output Summary	Predicted cr F+I	rash frequ PDO	ency, crashe Total	s / year			Combined CI F+I	MF PDO
Total crashe		3.534			Total-vehi	cle crashes	0.731	0.731
Total-vehicle crashe	es 3.905	3.534		Vel	nicle-pedestri	an crashes	4.150	
Vehicle-pedestrian crashe Vehicle-bicycle crashe					Severity d	istribution fo	r F+I crashes	
					0.024		1.136	2.911
Input Data			<u>Value</u>		Advisory N	Messages		
Intersection Data			0 1 1					
Area type			Suburban		48C intox	acation tun	_	
Number of legs Traffic control type			4 Signalized		450 Inter	section type	3	
Lighting present?			Yes		- :			
Red-light cameras present?			No					
Daily pedestrian volume crossi			237					
Maximum number of lanes cros			8		<u>.</u>			
Number of bus stops within 1,00 School(s) present within 1,000			2 No		<u>.</u>			
Alcohol sales establishments v		אווי	0		<u>.</u> :			
Street Data				Minor	<u> </u>			
Street configuration	NDT) 1/1			wo-way		ection conf	iguration	
Annual average daily traffic (An Number of through lanes	ADT), ven/day		42749 6	930	4.			
Number of approaches with lef	t-turn lanes		2		1.			
Number of left-turn movements		d phasing			2.			
Number of right-turn movemen	•		0		0.			
Number of U-turn movements			0		0.			
Number of approaches with rig	ht-turn channe	lization	0					
Calibration Factors			<u>Value</u>			<u>Default Val</u>	<u>ues</u>	
Local calibration factor (C)			1.000			1.000		
Adjustment factor for pedestria	ns for stop cor	ntrol (f_{ped})	0.049			0.049		
Adjustment factor for bicyclists	,,		0.019			0.019		
Severity distribution calibration			1.000			1.000		
Severity distribution calibration	factor, 1-way	(C _{sdf,owi})	1.000			1.000		
Probability of fatality given K+A	severity (P _{K K}	(+A)	0.094			0.094		
			Mann	er of Co	Ilision Propo	rtions		
2x2 intersections							4SG, F+I 4S	
Rear-end collision proportion	0.094	0.154		0.18			0.083	0.148
Angle colllision proportion	0.764	0.629		0.55			0.746	0.552
1x2 or 1x1 intersections							4SG, F+I 4S	
Rear-end collision proportion Angle colllision proportion	0.100	0.100		0.14 0.57			0.030 0.837	0.059
Crash Modification Factors	0.300	0.230	F+I	0.57	0.022	PDO	0.031	0.133
Total-vehicle crash CMFs Lighting			0.911			0.911		
Red-light cameras			1.000			1.000		
•								
Left-turn signal phasing			0.740			0.740		
Right-turn-on-red			1.000			1.000		
U-turn prohibition			1.000			1.000		
Right-turn channelization			1.000			1.000		
Number of lanes			1.085			1.085		
Vehicle-pedestrian crash CMF	S		4.450					
Bus stops Schools			4.150 1.000					
Alcohol sales establishments			1.000					
, asonor suice establishments			1.000					



Crossroad Predictive Crash Analysis Predicted Crash Frequency for Six-Lane and OneWay Urban and Suburban Arterials using NCHRP Report 17-58

for the

Preferred Alternative

Safety Prediction Worksheet for Two-Way Urd General Information		nformation
		number CO-166
Analyst TL Agency ATCS		name Democracy Blvd from Taveshire
Date 1/31/2022		ent number 1
Location Montgomery County	•	sis year 2045
Add to Totals worksheet	Restore equations	Reset input cells
<u> </u>	n frequency, crashes / ye	
F+/	PDO Total	F+I PDO
Total crashes 0.718	0.987 1.705	Multiple-vehicle crashes 0.685 0.685
Multiple-vehicle crashes 0.473 Single-vehicle crashes 0.207	0.726 0.261	Single-vehicle crashes 2.266 2.266
Vehicle-pedestrian crashes 0.025	0.201	Severity distribution for F+I crashes
Vehicle-bicycle crashes 0.013		K A B C
		0.009 0.057 0.221 0.43
<u>Input Data</u>	<u>Value</u>	<u>Advisory Messages</u>
Basic Roadway Data		
Area type	Suburban	•
Segment type Segment length, mi	6D 0.13	•
Annual average daily traffic (AADT), veh/day	42976	•
Number of highway-rail grade crossings present	0	•
Posted speed limit, mi/h	35	
Automated speed enforcement present?	No	:
Access Data		
Driveway count Major commercial	1	8 major comm. driveways per mile.
Major industrial	0	
Minor	0	•
Cross Section Data		
Lane width, ft	10	
Outside shoulder width, ft	1.5	
Median width, ft	23	
Median barrier present?	Yes	•
Roadside Data		
Roadside fixed object count Average roadside fixed object offset, ft	5	38 objects per mile.
Calibration Factors	Value	Default Values
<u> </u>		
Local calibration factor (C)	1.000	1.000
Adjustment factor for pedestrians (f_{ped})	0.015	0.015
Adjustment factor for bicyclists (f_{bike})	0.008	0.008
Severity distribution calibration factor ($C_{sdf,tws}$)	1.000 F+I	1.000 PDO
<u>Crash Modification Factors</u>	Multiple Single	Multiple Single
Lane width	1.045 1	.045 1.045 1.045
Outside shoulder width		.000 1.000 1.000
Median width		.955 0.955 0.955
Median barrier		.967 0.600 1.967
Highway-rail grade crossing		.000 1.000 1.000
Major commercial driveways	1.220	1.220
Major industrial driveways Minor driveways	0.989 0.947	0.989 0.947
		.000 1.000 1.000
Automated speed enforcement		

General Information	Site Info	<u>ormation</u>
Analyst TL	Street n	number CO-166
Agency ATCS	Street n	
Date 1/31/2022		nt number 2
Location Montgomery County	Analysis	
Add to Totals worksheet	Restore equations	Reset input cells
Output Summary Predicted cra	sh frequency, crashes / yea	r Combined CMF
F+I	PDO Total	F+I PDO
Total crashes 1.892	2.585 4.477	Multiple-vehicle crashes 0.527 0.527
Multiple-vehicle crashes 1.115	1.733	Single-vehicle crashes 2.299 2.299
Single-vehicle crashes 0.676	0.852	
Vehicle-pedestrian crashes 0.066		Severity distribution for F+l crashes
Vehicle-bicycle crashes 0.035		K A B C
		0.023 0.150 0.582 1.137
Input Data	<u>Value</u>	Advisory Messages
Basic Roadway Data	Cubumban	
Area type Segment type	Suburban 6D	•
Segment lype Segment length, mi	0.43	•
0 0	40470	•
Annual average daily traffic (AADT), veh/day Number of highway-rail grade crossings preser	-	•
	35	•
Posted speed limit, mi/h Automated speed enforcement present?	No.	•
Automated speed emorcement present?	INO	•
Access Data		
Driveway count Major commercial	0	
Major industrial	2	5 major industrial driveways per mile.
Minor	0	
Cross Section Data		
Lane width, ft	12	
Outside shoulder width, ft	1.5	
Median width, ft	23	
Median barrier present?	Yes	
Roadside Data		
Roadside <i>Data</i> Roadside fixed object count	24	56 objects per mile.
Average roadside fixed object offset, ft	7	
Calibration Factors	Value	<u>Default Values</u>
Local calibration factor (C)	1.000	1.000
Adjustment factor for pedestrians (f_{ped})	0.015	0.015
Adjustment factor for bicyclists (f _{bike})	0.008	0.008
Severity distribution calibration factor ($C_{sdf,tws}$)	1.000	1.000
Crash Modification Factors	F+I	PDO
	Multiple Single	Multiple Single
Lane width	1.000 1.0	1.000 1.000
Outside shoulder width	1.000 1.0	1.000 1.000
Median width	0.955 0.9	0.955 0.955
Median barrier	0.600 1.9	0.600 1.967
Highway-rail grade crossing	1.000 1.0	1.000 1.000
Major commercial driveways	0.932	0.932
Major industrial driveways	1.040	1.040
Minor driveways	0.947	0.947
Automated speed enforcement	1.000 1.0	1.000 1.000
Roadside fixed objects	1.2	

Safety Prediction Worksheet	for Urban an	d Suburb	an Arterial II	ntersect	tions			
General Information			<u>s</u>	Site Infor	mation			
Analyst TL			N	lajor str	eet name	Democracy	/ Blvd	
Agency ATCS					eet name	Taveshire \		
Date 1/31/2022					ion number	1		
Location Montgomery County	/		Α	nalysis	year	2045		
Add to Totals worksheet		Re	store equatior	ns		Re	set input cells	
Output Summary	Predicted ci F+I	rash frequ PDO	ency, crashe Total	s / year			Combined Cl F+I	MF PDO
Total crashe	es 2.466	2.201	4.668		Total-vehic	cle crashes	0.721	0.721
Total-vehicle crashe		2.201		Veh	icle-pedestri	an crashes	1.000	
Vehicle-pedestrian crashe Vehicle-bicycle crashe						istribution fo	r F+I crashes B	c C
					0.014	0.136	0.687	1.629
Input Data Intersection Data			<u>Value</u>		Advisory N	<u>Messages</u>		
Area type			Suburban		■.			
Number of legs			3		3SG inter	section typ	е	
Traffic control type			Signalized					
Lighting present?			Yes No		·			
Red-light cameras present? Daily pedestrian volume crossi	na all leas (ne	ds/day)	166		·			
Maximum number of lanes cross			8		- :			
Number of bus stops within 1,0			0					
School(s) present within 1,000		on?	No					
Alcohol sales establishments w	ithin 1,000 ft		0					
Street Data			Major N	1inor				
Street configuration Annual average daily traffic (AA	ADT), veh/day		43743	wo-way 407	5.	ection con	figuration	
Number of through lanes	turn lanca		6		4.			
Number of approaches with left Number of left-turn movements		d nhasing			<u>'</u> . <mark>1</mark> .			
Number of right-turn movemen	•		0		0.			
Number of U-turn movements p			2		1.			
Number of approaches with rig	ht-turn channe	elization	0		0.			
Calibration Factors			<u>Value</u>			<u>Default Val</u>	<u>ues</u>	
Local calibration factor (C)			1.000			1.000		
Adjustment factor for pedestria		ntrol (f_{ped})	0.051			0.051		
Adjustment factor for bicyclists	,		0.029			0.029		
Severity distribution calibration			1.000			1.000		
Severity distribution calibration			1.000			1.000		
Probability of fatality given K+A	severity (P _{K P}	_{(+A})	0.094			0.094		
					llision Propor			
2x2 intersections							4SG, F+1 4S	
Rear-end collision proportion Angle collision proportion	0.094	0.154 0.629		0.18 0.55	_		0.083 0.746	0.148 0.552
1x2 or 1x1 intersections							4SG, F+1 4S	
Rear-end collision proportion	0.100	0.100		0.14		0.065	0.030	0.059
Angle colllision proportion	0.300	0.250		0.57	_		0.837	0.733
Crash Modification Factors Total-vehicle crash CMFs			F+I			PDO		
Lighting			0.911			0.911		
Red-light cameras			1.000			1.000		
Left-turn signal phasing			0.860			0.860		
Right-turn-on-red			1.000			1.000		
U-turn prohibition			0.885			0.885		
o tarri prombition			1.000			1.000		
Right-turn channelization			1.0001					
· · · · · · · · · · · · · · · · · · ·			1.040			1.040		
Right-turn channelization Number of lanes Vehicle-pedestrian crash CMFs	3		1.040			1.040		
Right-turn channelization Number of lanes	3					1.040		

Safety Prediction Workshee	t for Urban an	d Suburb	an Arterial I	ntersec	tions			
General Information			<u>.</u>	Site Info	<u>rmation</u>			
Analyst TL				•	reet name	Democracy		
Agency ATCS					reet name	Fernwood F	Road	
Date 1/31/2022			-		tion number	2		
Location Montgomery Count	У		A	Analysis	year	2045		
Add to Totals worksheet		Re	store equation	ns		Res	et input cells	
Output Summary	Predicted c F+I	rash frequ PDO	iency, crashe Total	s / year	•	(Combined CI F+I	MF PDO
Total crash	es 4.325	3.614	7.939		Total-vehi	cle crashes	0.752	0.752
Total-vehicle crash		3.614		Vel	nicle-pedestri	an crashes	4.150	
Vehicle-pedestrian crash Vehicle-bicycle crash						_	r F+I crashes	
					0.024		1.143	2.930
Input Data			<u>Value</u>		Advisory N	<u>Messages</u>		
Intersection Data Area type			Suburban					
Number of legs			4		4SG inter	section type)	
Traffic control type			Signalized			- Journal Cope	•	
Lighting present?			Yes					
Red-light cameras present?			Yes					
Daily pedestrian volume cross			328		<u> </u>			
Maximum number of lanes cro			8		<u>.</u>			
Number of bus stops within 1,000			2		<u>.</u>			
School(s) present within 1,000 Alcohol sales establishments v		OII!	No 0		·			
Street Data				Лinor				
Street configuration				wo-way		ection conf	iguration	
Annual average daily traffic (A	ADT), veh/day	,	29192	1328				
Number of through lanes	ft turn lanca		6		4.			
Number of approaches with le Number of left-turn movement		d nhaeina	2		2 . 2 .			
Number of right-turn movement	•		0		0.			
Number of U-turn movements	•		0		0.			
Number of approaches with rig	•	elization	2		2.			
Calibration Factors			<u>Value</u>			Default Valu	<u>ues</u>	
Local calibration factor (C)			1.000			1.000		
Adjustment factor for pedestria	ans for stop co	ntrol (f _{ped})	0.049			0.049		
Adjustment factor for bicyclists			0.019			0.019		
Severity distribution calibration	,	(C _{sdf.twi})	1.000			1.000		
Severity distribution calibration			1.000			1.000		
Probability of fatality given K+/			0.094			0.094		
, , , ,	, N			er of Co	Ilision Propo			
2x2 intersections	3ST, F+I	<u>3ST, P</u> DO			O 4ST, F+I		4SG, F+1 4S	G, PDO
Rear-end collision proportion	0.094	0.154		0.18			0.083	0.148
Angle colllision proportion	0.764	0.629	0.676	0.55	0.806	0.707	0.746	0.552
1x2 or 1x1 intersections	3ST, F+I				O 4ST, F+I			G, PDO
Rear-end collision proportion	0.100	0.100		0.14			0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.57	71 0.822	0.706	0.837	0.733
<u>Crash Modification Factors</u> Total-vehicle crash CMFs			F+I			PDO		
Lighting			0.911			0.911		
Red-light cameras			0.851			0.851		
Left-turn signal phasing			0.547			0.547		
Right-turn-on-red			1.000			1.000		
U-turn prohibition			1.000			1.000		
Right-turn channelization			1.545			1.545		
Number of lanes			1.148			1.148		
Vehicle-pedestrian crash CMF	s					1.170		
Bus stops			4.150					
Schools			1.000					
Alcohol sales establishments			1.000					

Safety Prediction Worksheet	for Urban an	d Suburb	an Arterial I	ntersec	tions			
General Information			3	Site Info	rmation_			
Analyst TL			1	∕lajor str	reet name	MD 187 Old	d Georgetowi	n Rd
Agency ATCS					reet name	Lone Oak V	Vay/Manor O	ak Way
Date 1/31/2022					tion number	1		
Location Montgomery County	У		,	Analysis	year	2045		
Add to Totals worksheet		Re	store equatio	ns		Res	set input cells	
Output Summary	Predicted ci F+I	rash frequ PDO	ency, crashe Total	s / year			Combined Ci F+I	MF PDO
Total crashe		3.579			Total-vehi	cle crashes	0.911	0.911
Total-vehicle crashe		3.579		Vel	nicle-pedestr	ian crashes	5.603	
Vehicle-pedestrian crashe Vehicle-bicycle crashe						_	r F+I crashes	
					0.024		1.178	3.018
Input Data			<u>Value</u>		Advisory I	Messages .		
Intersection Data			Suburban					
Area type Number of legs			<u>4</u>		4SG inter	section type	a	
Traffic control type			Signalized			occion type	•	
Lighting present?			Yes		i.			
Red-light cameras present?			No					
Daily pedestrian volume crossi			301					
Maximum number of lanes cros			8					
Number of bus stops within 1,000			6 Voc		•			
School(s) present within 1,000 Alcohol sales establishments v		on?	Yes 0		<u>.</u> :			
Street Data			Major I	Minor				
Street configuration			Two-way	wo-way	2x2 inters	ection conf	iguration	
Annual average daily traffic (A	ADT), veh/day		51730	356				
Number of through lanes			6		2.			
Number of approaches with lef			2		0.			
Number of left-turn movements	•		0		0.			
Number of right-turn movements Number of U-turn movements	•	nrea	0		0.			
Number of approaches with rig	•	elization	0		0.			
Calibration Factors			<u>Value</u>			Default Valu	<u>ues</u>	
Local calibration factor (C)			1.000			1.000		
Adjustment factor for pedestria	ns for stop cor	ntrol (f _{ped})	0.049			0.049		
Adjustment factor for bicyclists		. ,, ,	0.019			0.019		
Severity distribution calibration		(C set twi	1.000			1.000		
Severity distribution calibration			1.000			1.000		
Probability of fatality given K+A			0.094			0.094		
. resummy or randing given it i	, , , , , , , , , , , , , , , , , , ,	N+A /		er of Co	Illision Propo			
2x2 intersections	3ST, F+I 3	ST, PDO			O 4ST, F+I		4SG, F+I 4S	SG, PDO
Rear-end collision proportion	0.094	0.154		0.18			0.083	0.148
Angle colllision proportion	0.764	0.629	0.676	0.55	0.806	0.707	0.746	0.552
1x2 or 1x1 intersections	3ST, F+I 3				O 4ST, F+I			SG, PDO
Rear-end collision proportion	0.100	0.100		0.14			0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.57	71 0.822	0.706	0.837	0.733
<u>Crash Modification Factors</u> Total-vehicle crash CMFs			F+I			PDO		
Lighting			0.911			0.911		
Red-light cameras			1.000			1.000		
Left-turn signal phasing			1.000			1.000		
Right-turn-on-red			1.000			1.000		
U-turn prohibition			1.000			1.000		
Right-turn channelization			1.000			1.000		
Number of lanes			1.000			1.000		
Vehicle-pedestrian crash CMF.	s		4.450					
Bus stops Schools			4.150 1.350					
Alcohol sales establishments			1.350					
A NOOTION SAICS CSTADIISTITICITES			1.000					

General Information	<u>Site Ir</u>	nformation	
Analyst TL	Stree	t number	MD 187
Agency ATCS	Street	t name	Lone Oak Way/Manor Oak Way
Date 1/31/2022	•	nent number	1
Location Montgomery County	Analy	sis year	2045
Add to Totals worksheet	Restore equations		Reset input cells
Output Summary Predicted cras	sh frequency, crashes / ye	ear	Combined CMF
F+I	PDO Total		F+I PDO
Total crashes 1.432	1.912 3.343		nicle crashes 0.569 0.569
Multiple-vehicle crashes 0.929 Single-vehicle crashes 0.427	1.378 0.534	Single-ver	nicle crashes 2.308 2.308
Vehicle-pedestrian crashes 0.049	0.334	Severity	distribution for F+I crashes
Vehicle-bicycle crashes 0.026		=	K A B C
		0.02	
Input Data	<u>Value</u>	Advisory	Messages
Basic Roadway Data			
Area type	Suburban		
Segment type	6D		
Segment length, mi	0.24		
Annual average daily traffic (AADT), veh/day	52544 ot 0	•	
Number of highway-rail grade crossings presen Posted speed limit, mi/h	40	•	
Automated speed enforcement present?	No		
Access Data			
Driveway count Major commercial	0		
Major industrial	0		
Minor	2	8 minor	driveways per mile.
Cross Section Data			
Lane width, ft	11		
Outside shoulder width, ft	1		
Median width, ft	15		
Median barrier present?	Yes		
Roadside Data			
Roadside fixed object count	9	38 objec	ts per mile.
Average roadside fixed object offset, ft	8	•	
Calibration Factors	<u>Value</u>		<u>Default Values</u>
Local calibration factor (C)	1.000		1.000
Adjustment factor for pedestrians (f_{ped})	0.015		0.015
Adjustment factor for bicyclists (f_{bike})	0.008		0.008
Severity distribution calibration factor ($C_{sdf,tws}$)	1.000		1.000
Crash Modification Factors	F+1	•	PDO Multiple Single
Lane width	Multiple Single 1.022 1	1.022	Multiple Single 1.022 1.022
Outside shoulder width		.014	1.014 1.014
Median width		.000	1.000 1.000
Median barrier		.967	0.600 1.967
Highway-rail grade crossing		.000	1.000 1.000
Major commercial driveways	0.932		0.932
Major industrial driveways	0.989		0.989
Minor driveways	0.991		0.991
	4.000	0001	4 0001 4 0001
Automated speed enforcement Roadside fixed objects		1.000 1.131	1.000 1.000 1.131

General Information	Site In:	formation		
Analyst TL		number	MD 187	
Agency ATCS	Street		I-495 to Ryland Dr	
Date 1/31/2022	Segme	ent number	2	
Location Montgomery County	Analys	is year	2045	
Add to Totals worksheet	Restore equations		Reset input cel	ls
Output Summary Predicted ci	rash frequency, crashes / yea	ar	Combined	CMF
<u>F+I</u>	PDO Total		<u>F+I</u>	PDO
Total crashes 0.465	0.618 1.083		nicle crashes 0.535	0.535
Multiple-vehicle crashes 0.281	0.419	Single-vel	nicle crashes 2.614	2.614
Single-vehicle crashes 0.159	0.199	0 "	"	
Vehicle-pedestrian crashes 0.016		-	distribution for F+I crash	_
Vehicle-bicycle crashes 0.008		0.00	K A B 07 0.037 0.143	0.278
Input Data	Value		Messages	0.270
Basic Roadway Data	<u> </u>			
Area type	Suburban			
Segment type	6D	:		
Segment length, mi	0.08			
Annual average daily traffic (AADT), veh/day	51081			
Number of highway-rail grade crossings prese				
Posted speed limit, mi/h	40			
Automated speed enforcement present?	No			
Access Data				
Driveway count Major commercial	0			
Major industrial	0			
Minor	0			
Cross Section Data				
Lane width, ft	11			
Outside shoulder width, ft	1			
Median width, ft	18			
Median barrier present?	Yes			
Roadside Data				
Roadside bata Roadside fixed object count	9	113 obie	ects per mile.	
Average roadside fixed object offset, ft	10		•	
Calibration Factors	<u>Value</u>		Default Values	
Local calibration factor (C)	1.000		1.000	
Adjustment factor for pedestrians (f_{ped})	0.015		0.015	
Adjustment factor for bicyclists (f _{bike})	0.008		0.008	
Severity distribution calibration factor ($C_{sdf.tws}$)			1.000	
Crash Modification Factors	F+I		PDO	
	Multiple Single		Multiple Single	
Lane width		022	1.022 1.022	
Outside shoulder width		014	1.014 1.014	
Median width		983	0.983 0.983	
Median barrier	I	967	0.600 1.967	
Highway-rail grade crossing		000	1.000 1.000	
Major commercial driveways	0.932		0.932	
Major industrial driveways	0.989		0.989	
Minor driveways	0.947		0.947	
Automated speed enforcement		000 304	1.000 1.000 1.304	
Roadside fixed objects				

Safety Prediction Worksheet	for Urban an	d Suburb	an Arterial I	ntersec	tions			
General Information			3	Site Infor	rmation			
Analyst TL			1	Major str	eet name	MD 187 Old	d Georgetowr	n Rd
Agency ATCS					eet name	Ryland Dr		
Date 1/31/2022	_		-		ion number	2		
Location Montgomery County			,	Analysis	year	2045		_
Add to Totals worksheet		Re	store equatio	ns		Res	set input cells	
Output Summary	Predicted c	rash frequ PDO	ency, crashe Total	es / year			Combined Cl F+l	MF PDO
Total crashe		3.663				cle crashes	0.911	0.911
Total-vehicle crashe		3.663]	Veh	nicle-pedestri	an crashes	5.603	
Vehicle-pedestrian crashe Vehicle-bicycle crashe					Severity d		r F+I crashes B	С
					0.025		1.186	3.038
Input Data			<u>Value</u>		Advisory N	<u> Messages</u>		
Intersection Data Area type			Suburban		■.			
Number of legs			4		4SG inter	section type)	
Traffic control type			Signalized			31		
Lighting present?			Yes					
Red-light cameras present? Daily pedestrian volume crossi	na all logo (r-	de/dov/	No 182		<u>.</u>			
Maximum number of lanes cross			7					
Number of bus stops within 1,0			5		- :			
School(s) present within 1,000			Yes					
Alcohol sales establishments w	vithin 1,000 ft		0					
Street Data			Major I	Minor				
Street configuration				Гwo-way	2x2 inters	ection conf	iguration	
Annual average daily traffic (AA	ADT), veh/day		50974	393				
Number of through lanes			6		2.			
Number of approaches with left Number of left-turn movements		d phaeina	2		0.			
Number of right-turn movemen	•		0		0.			
Number of U-turn movements	•		0		0.			
Number of approaches with rig	ht-turn channe	elization	0		0.			
Calibration Factors			<u>Value</u>			Default Valu	ues	
Local calibration factor (C)			1.000			1.000		
Adjustment factor for pedestria	ns for stop cor	ntrol (f_{ped})	0.049			0.049		
Adjustment factor for bicyclists	(5///0)		0.019			0.019		
Severity distribution calibration			1.000			1.000		
Severity distribution calibration	factor, 1-way	(C _{sdf,owi})	1.000			1.000		
Probability of fatality given K+A	severity ($P_{K F}$	$_{K+A}$)	0.094			0.094		
					llision Propor			
2x2 intersections							4SG, F+I 4S	
Rear-end collision proportion	0.094	0.154 0.629		0.18			0.083	0.148
Angle colllision proportion	0.764			0.55			0.746	0.552
1x2 or 1x1 intersections Rear-end collision proportion	3ST, F+I 3	3ST, PDO 0.100		3SG, PD 0.14			4SG, F+I 4S 0.030	3G, PDO 0.059
Angle collision proportion	0.100	0.100		0.14			0.030	0.039
Crash Modification Factors	2.000	2.200	F+I	0.01	3.022	PDO	3.001	30
Total-vehicle crash CMFs			0.044			0.014		
Lighting Red light cameras			0.911			0.911		
Red-light cameras			1.000			1.000		
Left-turn signal phasing			1.000			1.000		
Right-turn-on-red			1.000			1.000		
U-turn prohibition			1.000			1.000		
			1.000			1.000		
Right-turn channelization								
Number of lanes	_		1.000			1.000		
Number of lanes Vehicle-pedestrian crash CMFs	S					1.000		
Number of lanes	S		4.150 1.350			1.000		

General In	formation		Site	e Information		
	TL			eet number	MD 187	
Agency	ATCS			eet number eet name	Old Georgetown	Pd from Pock
Date	1/31/2022			gment number	old Georgelown	Nu IIOIII NOCK
	Montgomery County		•	alysis year	2045	
Location	ivioritgornery County		Allo	aiysis yeai	2043	
Add to	Totals worksheet	Rest	ore equations		Reset in	out cells
Output Sui	mmary Predicte	d crash freque	ncy, crashes /	'year	Comb	bined CMF
		-	Total			F+I PDC
	Total crashes 0.85	7 1.100	1.957	Multiple-vehi	icle crashes (0.529
M	ultiple-vehicle crashes 0.37	0.546		Single-vehi	icle crashes	5.686 5.68
5	Single-vehicle crashes 0.44	0.554		· ·		•
	cle-pedestrian crashes 0.02			Severity o	listribution for F+I	crashes
	ehicle-bicycle crashes 0.01			K		В (
·	ornole bioyele elderlee	<u> </u>		0.013		0.263 0.51
Input Data			Value_	Advisory I	<u>Messages</u>	-
Basic Roa	dway Data	_				
Area type	· · · · · · · · · · · · · · · · · · ·		Suburban	_		
Segment t	vne		6D	•		
Segment le			0.1	•		
•	erigiti, till erage daily traffic (AADT), veh/d	lov	53713	•		
				•		
	highway-rail grade crossings p	esent	0	•		
	eed limit, mi/h		40	•		
Automated	I speed enforcement present?	L	No	•		
Access Da	nta					
Driveway o			O			
Dilveway c	Major industrial	-	0	•		
	Minor	-	1	10 minor	drivovovo nor m	ilo
	WIITOI	L	L	10 minor	driveways per m	iie.
Cross Sec	tion Data					
Lane width	n. ft		12			
	oulder width, ft		1.5			
Median wid			23	•		
	rrier present?	-	Yes	•		
iviculari ba	mei present:	_	163	•		
Roadside l	Data	_				
Roadside f	fixed object count		30	300 objec	ts per mile.	
Average ro	padside fixed object offset, ft		3			
Calibration	Factors	<u> </u>	Value_		<u>Default Values</u>	
Local calib	ration factor (C)	T T	1.000		1.000	
	t factor for pedestrians (f_{ped})		0.015		0.015	
		-				
-	t factor for bicyclists (f _{bike})	_	0.008		0.008	
Severity di	stribution calibration factor (C_{sd}	t _{tws})	1.000		1.000	
Crash Mod	dification Factors		=+ Multiple Sin	alo	PDO	•
Lane width		<i>'</i> /	Multiple Sin 1.000		Multiple Single	e 1.000
				1.000		
	oulder width	 	1.000	1.000		1.000
Median wi		Ļ	0.955	0.955		0.955
Median ba		Ļ	0.600	1.967		1.967
	ail grade crossing	L	1.000	1.000		1.000
	mercial driveways	L	0.932		0.932	
	strial driveways	Γ	0.989		0.989	
Minor drive	eways		1.000		1.000	
				1.000		1.000
Automated	l speed enforcement		1.000	1.000	1.000	1.000

General Information	Site	<u>Information</u>	
Analyst TL	Stre	et number	MD 187
Agency ATCS	Stre	et name	Old Georgetown Rd from I-270 N
Date 1/31/2022	•	ment number	2
Location Montgomery County	Anal	ysis year	2045
Add to Totals worksheet	Restore equations		Reset input cells
Output Summary Predicted crass	h frequency, crashes/	/ear	Combined CMF
F+I	PDO Total		F+I PDO
Total crashes 1.071 Multiple-vehicle crashes 0.553	1.382 2.453		hicle crashes 0.515 0.515 hicle crashes 4.098 4.098
Multiple-vehicle crashes 0.553 Single-vehicle crashes 0.462	0.806 0.577	Single-ve	micie crasnes 4.096 4.096
Vehicle-pedestrian crashes 0.036	0.511	Severity	distribution for F+I crashes
Vehicle-bicycle crashes 0.019		-	K A B C
		0.01	
Input Data	<u>Value</u>	Advisory	<u>Messages</u>
Basic Roadway Data			
Area type	Suburban		
Segment type	6D	•	
Segment length, mi	0.14	•	
Annual average daily traffic (AADT), veh/day Number of highway-rail grade crossings present	<u>57854</u>	•	
Posted speed limit, mi/h	40	•	
Automated speed enforcement present?	No		
Access Data			
Driveway count Major commercial	0		
Major industrial	0		
Minor	1	7 minor	driveways per mile.
Cross Section Data			
Lane width, ft	12		
Outside shoulder width, ft	1.5		
Median width, ft	25	•	
Median barrier present?	Yes	•	
Roadside Data	0.5		
Roadside fixed object count Average roadside fixed object offset, ft	25 3	179 obje	ects per mile.
Calibration Factors	Value	•	Default Values
Local calibration factor (C)	1.000		1.000
Adjustment factor for pedestrians (f_{ped})	0.015		0.015
Adjustment factor for bicyclists (f_{bike})	0.008		0.008
Severity distribution calibration factor ($C_{sdf.tws}$)	1.000		1.000
Crash Modification Factors	F+I		PDO
	Multiple Sing	<u>le</u>	Multiple Single
Lane width	1.000	1.000	1.000 1.000
Outside shoulder width		1.000	1.000 1.000
Median width		0.945	0.945 0.945
Median barrier	0.600	1.967	0.600 1.967
Highway-rail grade crossing	1.000 0.932	1.000	1.000 1.000 0.932
Major commercial driveways Major industrial driveways	0.932		0.932
Minor driveways	0.985		0.985
Automated speed enforcement	1.000	1.000	1.000 1.000

Safety Prediction Worksheet	for Urban and	d Suburb	an Arterial I	ntersec	<u>tions</u>			
General Information			5	Site Info	rmation			
Analyst TL			M	∕lajor str	eet name	MD 187 (Old	d Georgetow	n Rd)
Agency ATCS					eet name	Rock Spring	Dr	
Date 1/31/2022					ion number	4		
Location Montgomery County			F	Analysis	year	2045		_
Add to Totals worksheet		Re	store equation	ns		Res	et input cells	
Output Summary	Predicted ci F+I	rash frequ PDO	ency, crashe Total	s / year		C	Combined CN F+I	MF PDO
Total crashe		3.800				cle crashes	0.619	0.619
Total-vehicle crashe		3.800		Vel	nicle-pedestr	ian crashes	6.275	
Vehicle-pedestrian crashe Vehicle-bicycle crashe					Severity d K	istribution for Δ	F+I crashes B	С
					0.027		1.305	3.344
Input Data Intersection Data			<u>Value</u>		Advisory I	Messages_		
Area type			Suburban		■.			
Number of legs			4		4SG inter	section type		
Traffic control type			Signalized					
Lighting present?			Yes No		•			
Red-light cameras present? Daily pedestrian volume crossi	na all leas (ne	(veh/ah	256		•			
Maximum number of lanes cross			8		- :			
Number of bus stops within 1,0			2					
School(s) present within 1,000		on?	Yes					
Alcohol sales establishments w	rithin 1,000 ft		2	_				
Street Data			Major I	Minor	<u>.</u>			
Street configuration				wo-way		section confi	guration	
Annual average daily traffic (AANumber of through lanes	ADT), veh/day		52878 6	1816	2.			
Number of approaches with lef	t-turn lanes		2		1			
Number of left-turn movements		d phasing			2.			
Number of right-turn movemen	ts prohibited o	n red	0		0.			
Number of U-turn movements			0		0.			
Number of approaches with rig	nt-turn channe	elization	1		0.	Defectly Valu		
Calibration Factors			<u>Value</u>			<u>Default Valu</u>	<u>es</u>	
Local calibration factor (C)			1.000			1.000		
Adjustment factor for pedestria		ntrol († _{ped})				0.049		
Adjustment factor for bicyclists	,	(0)	0.019			0.019		
Severity distribution calibration			1.000			1.000		
Severity distribution calibration			1.000			1.000		
Probability of fatality given K+A	seventy (P _{K k}	(+A)	0.094			0.094		
2x2 intersections	3ST F+I 3	BST. PDO			<u>llision Propo</u> O 4ST F+I	<u>rtions</u> 4ST, PDO 4	4SG. F+1 4.9	G. PDO
Rear-end collision proportion	0.094	0.154		0.18			0.083	0.148
Angle colllision proportion	0.764	0.629		0.55	_		0.746	0.552
1x2 or 1x1 intersections	3ST, F+I 3					4ST, PDO		G, PDO
Rear-end collision proportion	0.100	0.100		0.14	_		0.030	0.059
Angle colllision proportion	0.300	0.250		0.57	71 0.822		0.837	0.733
<u>Crash Modification Factors</u> Total-vehicle crash CMFs			F+I			PDO		
Lighting			0.911			0.911		
Red-light cameras			1.000			1.000		
Left-turn signal phasing			0.547			0.547		
Right-turn-on-red			1.000			1.000		
U-turn prohibition			1.000			1.000		
Right-turn channelization			1.243			1.243		
Number of lanes			1.000			1.000		
Vehicle-pedestrian crash CMFs	5							
Bus stops			4.150					
Schools Alcohol sales establishments			1.350 1.120					
, asserter sailes establistiffetills			1.120					

Safety Pro	ediction Worksheet	<u>for Urban an</u>	d Suburb	an Arterial I	ntersect	<u>tions</u>			
General In	nformation			<u>.</u>	Site Infor	mation			
Analyst	PC			ľ	∕lajor str	eet name	MD 187 (C	old Georgetov	vn Rd)
Agency	ATCS					eet name		Ramp Connec	tor/I-270
Date	1/31/2022			-		ion number	5		
Location	Montgomery County			F	Analysis	year	2045		
Add to	o Totals worksheet		Re	store equation	ns		Re	set input cells	
Output Su	<u>mmary</u>	Predicted c F+I	rash frequ PDO	ency, crashe Total	s / year			Combined C	MF PDO
	Total crashe	s #N/A	#N/A	#N/A		Total-vehi	cle crashes	1.126	1.126
	Total-vehicle crashe		#N/A		Veh	icle-pedestri	an crashes	1.000	
	cle-pedestrian crashe ′ehicle-bicycle crashe	-				•		or F+I crashe	s C
						#N/A	#N/A	#N/A	#N/A
Input Data	='			<u>Value</u>		Advisory N	<u> Messages</u>		
Intersection Area type	ni Dala			Suburban		■.			
Number of	f legs			3		3SG inter	section typ	e	
Traffic con	•			Signalized				-	
Lighting pr				Yes		.			
Red-light of	cameras present?			No					
	estrian volume crossir			52					
	number of lanes cros			6		·			
	f bus stops within 1,0			0 No		·			
. ,	present within 1,000 lles establishments w		on:	No 0		<u>.</u>			
Street Dat	'a			Major I	Лinor				
Street con	figuration			Two-way (One-way	Major stre	et must be	one-way.	
Annual av	erage daily traffic (AA	ADT), veh/day		49223	895			_	
Number of	f through lanes			8		2 Invalid lar	ne count co	mbination.	
	f approaches with left			1		1.			
	f left-turn movements	•				<u>1</u> .			
	f right-turn movement	•	n red	0		0.			
	f U-turn movements p f approaches with rigl		elization	1		0 .			
Calibration				Value		<u> </u>	Default Va	lues	
	oration factor (C)			1.000			1.000		
	nt factor for pedestria	as for stop on	otrol (f)						
			illi (I _{ped})				0.051		
-	nt factor for bicyclists		(0	0.029			0.029		
	istribution calibration			1.000			1.000		
	istribution calibration			1.000			1.000		
Probability	of fatality given K+A	severity ($P_{K A}$	_{K+A})	0.094			0.094		
2x	2 intersections	3ST. F+I	3ST. PDO			<u>llision Propoi</u> O 4ST, F+I		4SG, F+I 4	SG. PDO
	collision proportion	0.094	0.154		0.18			0.083	0.148
	ision proportion	0.764	0.629		0.55		1	0.746	0.552
1x2 oi	r 1x1 intersections	3ST, F+I	3ST, PDO	3SG, F+1 3	SG, PD	O 4ST, F+I	4ST, PDO	4SG, F+I 4	SG, PDO
	collision proportion	0.100	0.100		0.14			0.030	0.059
	ision proportion	0.300	0.250		0.57	_		0.837	0.733
	dification Factors cle crash CMFs			F+I			PDO		
Lighting				0.911			0.911		
Red-light	cameras			1.000			1.000		
Ū	ignal phasing			0.740			0.740		
Right-turn				1.000			1.000		
ū									
U-turn pro				0.960			0.960		
ū	channelization			1.243			1.243		
Number of	i iailes			1.401			1.401		
Vehicle-no	edestrian crash CME	2							
•	edestrian crash CMFs	3		1.000					
Vehicle-pe Bus stops Schools		3		1.000 1.000					

Safety Prediction Worksheet 1	or Urban an	d Suburb	an Arterial II	ntersect	ions			
General Information				Site Infor	mation			
Analyst PC			_		et name	MD 187 (O	ld Georgetov	vn Rd)
Agency ATCS				•	et name		amp Connec	
Date 1/31/2022			li I	ntersecti	on number	6		
Location Montgomery County			P	nalysis	/ear	2045		
Add to Totals worksheet		Res	store equation	ns		Res	set input cells	
Output Summary	Predicted ci	rash frequ PDO	ency, crashe Total	s / year		_	Combined C F+I	MF PDO
Total crashes		#N/A	#N/A			cle crashes	1.145	1.145
Total-vehicle crashes Vehicle-pedestrian crashes		#N/A]	ven	icle-pedestri	an crasnes	1.000	
Vehicle-bicycle crashes					Severity di	stribution fo	r F+I crashes	5
					K #N/A	#N/A	B #N/A	#N/A
Input Data			<u>Value</u>		Advisory N	<u>lessages</u>		
Intersection Data								
Area type			Suburban					
Number of legs			3		3SG inters	section type	е	
Traffic control type			Signalized		ŀ			
Lighting present? Red-light cameras present?			Yes No		<u> </u> •			
Daily pedestrian volume crossin	a all leas (ne	ds/dav)	175		-			
Maximum number of lanes cross	· · · · ·	• ,	6		Ī.			
Number of bus stops within 1,00			0					
School(s) present within 1,000 f		on?	No					
Alcohol sales establishments wi	thin 1,000 ft		0					
Street Data			Major N	<i>linor</i>				
Street configuration			,	ne-way		et must be	one-way.	
Annual average daily traffic (AA	DT), veh/day		56457	6479				
Number of through lanes Number of approaches with left-	turn lance		8		Invalid lar	ie count co	mbination.	
Number of left-turn movements		d nhasing	1		<u> </u>			
Number of right-turn movements	•		0))			
Number of U-turn movements p	rohibited		1		0.			
Number of approaches with righ	t-turn channe	lization	1		1.			
Calibration Factors			<u>Value</u>			Default Val	<u>ues</u>	
Local calibration factor (C)			1.000			1.000		
Adjustment factor for pedestrian	s for stop cor	ntrol (f_{ped})	0.051			0.051		
Adjustment factor for bicyclists (0.029			0.029		
Severity distribution calibration f			1.000			1.000		
Severity distribution calibration f			1.000			1.000		
Probability of fatality given K+A	severity ($P_{\kappa_{\parallel}}$	(+A)	0.094			0.094		
Ov0 interpolations	20T F.1.	OT 000			ision Propor		400 E.L.4	C BDC
2x2 intersections Rear-end collision proportion	0.094	0.154		0.189			4SG, F+I 45 0.083	0.148
Angle colllision proportion	0.764	0.629	0.676	0.554		0.707	0.746	0.552
1x2 or 1x1 intersections	3ST, F+I 3	ST, PDO	3SG, F+I 3	SG, PDC	0 4ST, F+I	4ST, PDO	4SG, F+I 4S	SG, PDO
Rear-end collision proportion	0.100	0.100	0.111	0.143		0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.57	0.822	0.706	0.837	0.733
Crash Modification Factors			F+I			PDO		
Total-vehicle crash CMFs								
Lighting			0.911			0.911		
Red-light cameras			1.000			1.000		
Left-turn signal phasing			0.740			0.740		
Right-turn-on-red			1.000			1.000		
U-turn prohibition			0.960			0.960		
Right-turn channelization			1.243			1.243		
Number of lanes			1.425			1.425		
Vehicle-pedestrian crash CMFs								
Bus stops			1.000					
Schools			1.000					
Alcohol sales establishments			1.000					

Safety Prediction Worksheet	for Urban an	d Suburb	an Arterial I	ntersect	ions			
General Information				Site Infor				
Analyst TL					et name	MD 187 (O	ld Georgetov	vn Rd)
Agency ATCS				•	et name	Tuckerman		vii i (d)
Date 1/31/2022			-		on number	7		
Location Montgomery County			A	nalysis	/ear	2045		
Add to Totals worksheet		Res	store equation	ns		Res	set input cells	
Output Summary	Predicted ci F+I	rash frequ PDO	ency, crashe Total	s / year			Combined C F+I	MF PDO
Total crashe		4.195			Total-vehic	cle crashes	0.639	0.639
Total-vehicle crashe		4.195		Veh	icle-pedestri	l l	5.603	
Vehicle-pedestrian crashe	-					•		
Vehicle-bicycle crashe	s 0.170				-	_	r F+I crashes	
					0.030	0.287	1.440	3.689
Input Data			<u>Value</u>		Advisory N	<u> 1essages</u>		
Intersection Data Area type			Suburban		_			
Number of legs			4		4SG inter	section typ	e	
Traffic control type			Signalized				-	
Lighting present?			Yes		<u>.</u>			
Red-light cameras present?			No		ŀ			
Daily pedestrian volume crossin	· · ·	• ,	327		ŀ			
Maximum number of lanes cros Number of bus stops within 1,00			7 5		<u>.</u>			
School(s) present within 1,000 f			Yes		- :			
Alcohol sales establishments wi			0					
Street Data			Major I	1inor				
Street configuration				wo-way	_	ection con	figuration	
Annual average daily traffic (AA	DT), veh/day		58152	2114	_			
Number of through lanes Number of approaches with left-	turn lanes		6 2		1 . 2 .			
Number of left-turn movements		d phasing	1		2 .			
Number of right-turn movement	•		0		1.			
Number of U-turn movements p			0		0.			
Number of approaches with righ	nt-turn channe	elization	0	(
Calibration Factors			<u>Value</u>			<u>Default Val</u>	<u>ues</u>	
Local calibration factor (C)			1.000			1.000		
Adjustment factor for pedestriar	ns for stop cor	ntrol (f_{ped})	0.049			0.049		
Adjustment factor for bicyclists (0.019			0.019		
Severity distribution calibration			1.000			1.000		
Severity distribution calibration			1.000			1.000		
Probability of fatality given K+A	severity (PKI)	_{(+A})	0.094			0.094		
					ision Propor			
2x2 intersections							4SG, F+I 4S	
Rear-end collision proportion Angle collision proportion	0.094	0.154 0.629	0.120 0.676	0.189			0.083 0.746	0.148 0.552
1x2 or 1x1 intersections Rear-end collision proportion	3S1, F+1 3 0.100	0.100	3SG, F+1 3	0.143		4S1, PDO 0.065	4SG, F+I 4S 0.030	0.059
Angle collision proportion	0.300	0.100	0.111	0.14			0.837	0.733
Crash Modification Factors			F+I			PDO		
Total-vehicle crash CMFs			•					
Lighting			0.911			0.911		
Red-light cameras			1.000			1.000		
Left-turn signal phasing			0.636			0.636		
Right-turn-on-red			0.980			0.980		
U-turn prohibition			1.000			1.000		
Right-turn channelization			1.000			1.000		
•			1.126			1.126		
Number of lanes								
Vehicle-pedestrian crash CMFs Bus stops			4.150					
Vehicle-pedestrian crash CMFs			4.150 1.350 1.000					

Safety Prediction Worksheet	for Urban and	Suburb	an Arterial I	ntersec	tions			
General Information				Site Info	rmation_			
Analyst TL			1	Иаjor str	reet name	MD 355 Ro	ckville Pike	
Agency ATCS			I	Minor str	reet name	Grosvenor	Ln	
Date 1/31/2022					tion number	1		
Location Montgomery County	/		,	Analysis	year	2045		
Add to Totals worksheet		Re	store equatio	ns		Re	set input cells	
Output Summary	Predicted cr	ash frequ PDO	ency, crashe Total	es / year	•		Combined CI F+I	MF PDO
Total crashe	0.000	2.847				cle crashes	0.528	0.528
Total-vehicle crashe		2.847		Vel	nicle-pedestr	ian crashes	4.150	
Vehicle-pedestrian crashe Vehicle-bicycle crashe					Severity d		r F+I crashes B	С
					0.020		0.994	2.357
Input Data Intersection Data			<u>Value</u>		Advisory I	<u>Messages</u>		
Area type			Suburban					
Number of legs			4		4SG inter	section type	e	
Traffic control type			Signalized					
Lighting present?			Yes Yes		•			
Red-light cameras present? Daily pedestrian volume crossii	na all leas (nea	ls/day)	156		•			
Maximum number of lanes cross			7		- :			
Number of bus stops within 1,0			4					
School(s) present within 1,000		n?	No					
Alcohol sales establishments w	rithin 1,000 ft		0					
Street Data			Major I	Minor				
Street configuration				Two-way		section conf	figuration	
Annual average daily traffic (AANumber of through lanes	ADT), veh/day		60115	991	12]. 2].			
Number of approaches with left	t-turn lanes		0		2.			
Number of left-turn movements		phasing			2.			
Number of right-turn movement	•	n red	0		0.			
Number of U-turn movements p		l:==4:=:=	2		2.			
Number of approaches with rig	ni-turn channe	iization			۷.	Dofault Val	400	
Calibration Factors			<u>Value</u>			Default Val	<u>ues</u>	
Local calibration factor (C)			1.000			1.000		
Adjustment factor for pedestrial		trol (f _{ped})				0.049		
Adjustment factor for bicyclists	,	٠ ،	0.019			0.019		
Severity distribution calibration			1.000			1.000		
Severity distribution calibration Probability of fatality given K+A			0.094			1.000		
Frobability of fatality given K+A	severity (F _{K K}	+ <i>A)</i>				0.094		
2x2 intersections	3ST F+1 2	ST PNA			<u>llision Propo</u> O 4ST F+I		4SG, F+I 4S	G PDO
Rear-end collision proportion	0.094	0.154		0.18			0.083	0.148
Angle colllision proportion	0.764	0.629		0.55			0.746	0.552
1x2 or 1x1 intersections	3ST, F+I 3	ST, PDO	3SG, F+I 3	SG, PD	O 4ST, F+I	4ST, PDO	4SG, F+I 4S	G, PDO
Rear-end collision proportion	0.100	0.100	0.111	0.14	13 0.047	0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.57	71 0.822	0.706	0.837	0.733
<u>Crash Modification Factors</u> Total-vehicle crash CMFs			F+I			PDO		
Lighting			0.911			0.911		
Red-light cameras			0.850			0.850		
Left-turn signal phasing			0.740			0.740		
Right-turn-on-red			1.000			1.000		
U-turn prohibition			0.922			0.922		
Right-turn channelization			1.000			1.000		
Number of lanes			1.000			1.000		
Vehicle-pedestrian crash CMFs	3							
Bus stops			4.150					
Schools Alcohol sales establishments			1.000					
VIRGINI SQUES ESTABLISHINGLIS			1.000					

General Information	Site In	<u>formation</u>	
Analyst TL	Street	number	MD 355
Agency ATCS	Street	name	Rockville Pike from Grosvenor Li
Date 1/31/2022	9	ent number	1
Location Montgomery County	Analys	sis year	2045
Add to Totals worksheet	Restore equations		Reset input cells
Output Summary Predicted cras	h frequency, crashes / ye	ar	Combined CMF
F+/	PDO Total		F+I PDO
Total crashes 1.167	1.530 2.698		nicle crashes 0.204 0.204
Multiple-vehicle crashes 0.785 Single-vehicle crashes 0.321	1.130 0.400	Single-ver	nicle crashes 0.840 0.840
Vehicle-pedestrian crashes 0.040	0.400	Severity	distribution for F+I crashes
Vehicle-bicycle crashes 0.021		-	K A B C
		0.01	
Input Data	<u>Value</u>	Advisory	<u>Messages</u>
Basic Roadway Data			
Area type	Suburban		
Segment type	6D		
Segment length, mi	0.46		
Annual average daily traffic (AADT), veh/day Number of highway-rail grade crossings present	62005	•	
Posted speed limit, mi/h	40	•	
Automated speed enforcement present?	No	:	
Access Data			
Driveway count Major commercial	0		
Major industrial	0		
Minor	1	2 minor	driveways per mile.
Cross Section Data			
Lane width, ft	12		
Outside shoulder width, ft	2		
Median width, ft	180		
Median barrier present?	Yes	•	
Roadside Data			
Roadside fixed object count	11	24 objec	cts per mile.
Average roadside fixed object offset, ft	6	•	2.6.444
Calibration Factors	<u>Value</u>		<u>Default Values</u>
Local calibration factor (C)	1.000		1.000
Adjustment factor for pedestrians (f_{ped})	0.015		0.015
Adjustment factor for bicyclists (f_{bike})	0.008		0.008
Severity distribution calibration factor ($C_{sdf,tws}$)	1.000		1.000
Crash Modification Factors	F+I Multiple Single		PDO Multiple Single
Lane width		.000	1.000 1.000
Outside shoulder width		986	0.986 0.986
Median width		390	0.390 0.390
Median barrier		967	0.600 1.967
Highway-rail grade crossing		000	1.000 1.000
Major commercial driveways	0.932		0.932
Major industrial driveways	0.989		0.989
Minor driveways Automated speed enforcement	0.959 1.000 1.	.000	0.959 1.000 1.000

Safety Prediction Worksheet	for Urban an	d Suburb	an Arterial I	ntersect	ions			
General Information				Site Infor	<u>mation</u>			
Analyst TL					eet name	MD 355 Ro	ckville Pike	
Agency ATCS				•	eet name	Pooks Hill F		
Date 1/31/2022			I	ntersecti	on number	2		
Location Montgomery County			A	nalysis	year	2045		
Add to Totals worksheet		Res	store equation	ns		Res	set input cells	
Output Summary	Predicted c	rash frequ PDO	ency, crashe Total	s / year			Combined C F+I	MF PDO
Total crashes		2.804				cle crashes	0.634	0.634
Total-vehicle crashes		2.804		Veh	icle-pedestri	an crashes	4.150	
Vehicle-pedestrian crashe: Vehicle-bicycle crashe:					Severity d	istribution fo	r F+I crashes	
Vernoie-bioyele drastie.	0.177				K		В	, c
					0.020		0.965	2.378
Input Data			<u>Value</u>		Advisory N	<u>Messages</u>		
Intersection Data					_			
Area type			Suburban			anation to	_	
Number of legs Traffic control type			3 Signalized		35G inter	section type	e	
Lighting present?			Yes		∃ :			
Red-light cameras present?			No		i.			
Daily pedestrian volume crossin	• • • • • • • • • • • • • • • • • • • •	• ,	78		_ .			
Maximum number of lanes cros			9		ŀ			
Number of bus stops within 1,00 School(s) present within 1,000 f			5 No					
Alcohol sales establishments wi		JII:	0		<u>.</u>			
Ctured Date			Maiau	Ain au				
Street Data			-,-	⁄linor	· =			
Street configuration	DT) veb/dev		Two-way 1	wo-way 1014		ection conf	iguration	
Annual average daily traffic (AA Number of through lanes	DT), ven/day		13422		9 . 2 .			
Number of approaches with left-	turn lanes		1		1.			
Number of left-turn movements	with protected	d phasing	1		1.			
Number of right-turn movement	•	n red	1		0.			
Number of U-turn movements p Number of approaches with righ		dization	0		0 .			
	it-turri Grianne	alization			<u>11</u> .	Defectly Val		
Calibration Factors			<u>Value</u>			Default Val	<u>ues</u>	
Local calibration factor (C)		-t1 (f)	1.000			1.000		
Adjustment factor for pedestrian		ntrol (r _{ped})				0.051		
Adjustment factor for bicyclists ((C)	0.029			0.029		
Severity distribution calibration to			1.000			1.000		
Severity distribution calibration t Probability of fatality given K+A			1.000 0.094			1.000 0.094		
. Tobability of fatality given NTA	Severity (FK)	K+A J			liaian D			
2x2 intersections	3ST. F+I 3	3ST. PDO			<u>lision Propoi</u> O 4ST, F+I		4SG, F+I 4S	SG. PDO
Rear-end collision proportion	0.094	0.154	0.120	0.18	9 0.079	0.098	0.083	0.148
Angle colllision proportion	0.764	0.629		0.55			0.746	0.552
1x2 or 1x1 intersections							4SG, F+I 4S	
Rear-end collision proportion Angle colllision proportion	0.100	0.100 0.250	0.111	0.14 0.57		0.065 0.706	0.030	0.059
	0.300	0.230		0.57	0.022		0.031	0.733
<u>Crash Modification Factors</u> Total-vehicle crash CMFs			F+I			PDO		
Lighting			0.044			0.044		
Red-light cameras			0.911 1.000			0.911 1.000		
Left-turn signal phasing			0.740			0.740		
Right-turn-on-red			0.740			0.740		
U-turn prohibition			0.960			0.960		
Right-turn channelization			1.000					
Number of lanes			1.000			1.000		
			1.000			1.000		
Vehicle-pedestrian crash CMFs Bus stops			4.150					
Schools			1.000					
Alcohol sales establishments			1.000					

General Information	Site II	nformation	
Analyst TL	Stree	t number	MD 355
Agency ATCS	Stree	t name	Rockville Pike from Pooks Hill Ro
Date 1/31/2022	•	ent number	2
Location Montgomery County	Analy	sis year	2045
Add to Totals worksheet	Restore equations		Reset input cells
Output Summary Predicted cras	sh frequency, crashes / ye	ear	Combined CMF
F+1	PDO Total		F+I PDO
Total crashes 0.733	0.960 1.693		nicle crashes 1.020 1.020
Multiple-vehicle crashes 0.631 Single-vehicle crashes 0.064	0.880 0.080	Single-ver	nicle crashes 1.191 1.191
Vehicle-pedestrian crashes 0.005	0.000	Severity	distribution for F+I crashes
Vehicle-bicycle crashes 0.013		-	K A B C
		0.00	
Input Data	<u>Value</u>	<u>Advisory</u>	<u>Messages</u>
Basic Roadway Data			
Area type	Suburban		
Segment type	6D		
Segment length, mi	0.06	•	
Annual average daily traffic (AADT), veh/day Number of highway-rail grade crossings presen	73388	•	
Posted speed limit, mi/h	35	•	
Automated speed enforcement present?	No		
Access Data			
Driveway count Major commercial	0		
Major industrial	0		
Minor	1	17 mino	r driveways per mile.
Cross Section Data			
Lane width, ft	11		
Outside shoulder width, ft	0		
Median width, ft	15		
Median barrier present?	No	•	
Roadside Data			
Roadside fixed object count	2	33 objec	ts per mile.
Average roadside fixed object offset, ft	8	•	
Calibration Factors	<u>Value</u>		<u>Default Values</u>
Local calibration factor (C)	1.000		1.000
Adjustment factor for pedestrians (f_{ped})	0.015		0.015
Adjustment factor for bicyclists (f_{bike})	0.008		0.008
Severity distribution calibration factor ($C_{sdf,tws}$)	1.000		1.000
Crash Modification Factors	F+I Multiple Single	_	PDO Multiple Single
Lane width		.022	1.022 1.022
Outside shoulder width		.044	1.044 1.044
Median width		.000	1.000 1.000
Median barrier		.000	1.000 1.000
Highway-rail grade crossing		.000	1.000 1.000
Major commercial driveways	0.932		0.932
Major industrial driveways	0.989		0.989
	1.037	.000	0.989 1.037 1.000 1.000

Safety Prediction Worksheet	for Urban and	Suburb	an Arterial I	ntersec	tions			
General Information			3	Site Info	rmation			
Analyst TL			1	Иаjor str	eet name	MD 355 Ro	ckville Pike	
Agency ATCS					eet name	Bellevue Di	r/Alta Vista R	d
Date 1/31/2022					ion number	3		
Location Montgomery County	/		,	Analysis	year	2045		
Add to Totals worksheet		Res	store equatio	ns		Res	set input cells	
Output Summary	Predicted cr	ash frequ PDO	ency, crashe Total	es / year			Combined CI F+I	MF PDO
Total crashe	0.000	2.982	6.632		Total-vehi	cle crashes	0.911	0.911
Total-vehicle crashe		2.982]	Vel	nicle-pedestri	ian crashes	4.150	
Vehicle-pedestrian crashe Vehicle-bicycle crashe					Severity d K		r F+I crashes B	c
					0.020		0.965	2.473
Input Data Intersection Data			<u>Value</u>		Advisory N	<u>Messages</u>		
Area type			Suburban		■.			
Number of legs			4		4SG inter	section type	е	
Traffic control type			Signalized		<u> </u>	•		
Lighting present?			Yes		<u>.</u>			
Red-light cameras present? Daily pedestrian volume crossi	na all logo (no -	le/dov/	No 77		<u>.</u>			
Maximum number of lanes cross			7		•			
Number of bus stops within 1,0			6					
School(s) present within 1,000			No					
Alcohol sales establishments w	vithin 1,000 ft		0					
Street Data			Major I	Minor				
Street configuration				Гwo-way		ection conf	figuration	
Annual average daily traffic (A	ADT), veh/day		69302	135				
Number of through lanes	t turn lanca		6		2.			
Number of approaches with lef Number of left-turn movements		l nhaeina			0.			
Number of right-turn movemen	•		0		0.			
Number of U-turn movements	•		0		0.			
Number of approaches with rig	ht-turn channe	lization	0		0.			
Calibration Factors			<u>Value</u>			Default Val	ues	
Local calibration factor (C)			1.000			1.000		
Adjustment factor for pedestria	ns for stop con	$trol(f_{ped})$	0.049			0.049		
Adjustment factor for bicyclists	(f bike)		0.019			0.019		
Severity distribution calibration	factor, 2-way (C _{sdf,twi})	1.000			1.000		
Severity distribution calibration	factor, 1-way (C _{sdf,owi})	1.000			1.000		
Probability of fatality given K+A	severity (P _{K K}	+A)	0.094			0.094		
			<u>Ma</u> nn	<u>er of C</u> o	Ilision Propo	rtions		
2x2 intersections			3SG, F+I 3	SG, PD	O 4ST, F+I	4ST, PDO	4SG, F+I 4S	
Rear-end collision proportion	0.094	0.154		0.18	_	+	0.083	0.148
Angle colllision proportion	0.764	0.629		0.55	- I	1	0.746	0.552
1x2 or 1x1 intersections							4SG, F+I 4S	
Rear-end collision proportion Angle collision proportion	0.100	0.100 0.250		0.14 0.57	_		0.030 0.837	0.059
Crash Modification Factors	0.500	0.230	F+1	0.01	0.022	PDO	0.007	0.733
Total-vehicle crash CMFs			0.044			0.044		
Lighting Red light cameras			0.911			0.911		
Red-light cameras			1.000			1.000		
Left-turn signal phasing			1.000			1.000		
Right-turn-on-red			1.000			1.000		
U-turn prohibition			1.000			1.000		
Right-turn channelization			1.000			1.000		
Number of lanes			1.000			1.000		
Vehicle-pedestrian crash CMF	S							
Bus stops Schools			4.150 1.000					
Alcohol sales establishments			1.000					
Alcohol sales establishments			1.000					

Safety Prediction Worksheet	for Urban an	d Suburb	an Arterial I	ntersect	ions			
General Information				Site Infor	<u>mation</u>			
Analyst TL			_		eet name	Sam Eig Hv	VV	
Agency ATCS				•	eet name		eat Senecca	Hwy
Date 1/31/2022			i	ntersecti	on number	1		
Location Montgomery County	1		A	nalysis	year	2045		
Add to Totals worksheet		Res	store equation	ns		Res	et input cells	
Output Summary	Predicted c	rash frequ PDO	ency, crashe Total	s / year		(Combined Ci F+I	MF PDO
Total crashe		2.915				cle crashes	0.769	0.769
Total-vehicle crashe		2.915		Veh	icle-pedestri	an crashes	1.000	
Vehicle-pedestrian crashe Vehicle-bicycle crashe					Severity d	istribution for	r F+I crashes	:
					K	A	В	С
					0.019	0.179	0.898	2.213
Input Data			<u>Value</u>		Advisory N	<u> 1essages</u>		
Intersection Data			0 1 1		_			
Area type			Suburban		200 inter	naction to		
Number of legs Traffic control type			3 Signalized		SSG INTER	section type	;	
Lighting present?			Yes		.			
Red-light cameras present?			No					
Daily pedestrian volume crossi	· · ·	• ,	67		<u>.</u>			
Maximum number of lanes cros			7		ŀ			
Number of bus stops within 1,0 School(s) present within 1,000			0 No		•			
Alcohol sales establishments w		OII:	0		<u>.</u> :			
Street Data			Major I	<i>Minor</i>	_			
Street configuration				wo-way	2v2 intere	ection conf	iguration	
Annual average daily traffic (A	ADT), veh/dav		37892			nor volume.	•	
Number of through lanes	,,		6		4.			
Number of approaches with lef			1		1.			
Number of left-turn movements	•		1		<u>1</u> .			
Number of right-turn movemen Number of U-turn movements	•	n red	0		1 0 .			
Number of approaches with rig		elization	0		1.			
Calibration Factors			Value			Default Valu	<u>ues</u>	
Local calibration factor (C)			1.000			1.000		
Adjustment factor for pedestria	ns for stop co	ntrol (f)	0.051			0.051		
Adjustment factor for bicyclists		rici (i pea)	0.029			0.029		
Severity distribution calibration		(C)	1.000			1.000		
Severity distribution calibration			1.000			1.000		
Probability of fatality given K+A			0.094			0.094		
, , , , , ,	3 (K)			er of Col	lision Propoi			
2x2 intersections			3SG, F+1 3	SG, PD	O 4ST, F+I	4ST, PDO	4SG, F+1 4S	
Rear-end collision proportion Angle colllision proportion	0.094	0.154 0.629	0.120 0.676	0.18			0.083 0.746	0.148 0.552
1x2 or 1x1 intersections							4SG, F+1 4S	
Rear-end collision proportion	0.100	0.100	0.111	0.14		0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.57			0.837	0.733
Crash Modification Factors			F+I			PDO	<u> </u>	
Total-vehicle crash CMFs								
Lighting			0.911			0.911		
Red-light cameras			1.000			1.000		
Left-turn signal phasing			0.740			0.740		
Right-turn-on-red			0.980			0.980		
U-turn prohibition			0.960			0.960		
Right-turn channelization			1.000			1.000		
Number of lanes			1.213			1.213		
Vehicle-pedestrian crash CMF	S							
Bus stops			1.000					
Schools			1.000					
Alcohol sales establishments			1.000					

General Information	Site Ir	nformation_	
Analyst TL	Street	t number	I-370
Agency ATCS	Street	t name	Sam Eig Hwy from MD 119 to Di
Date 1/31/2022	Segm	ent number	1
Location Montgomery County	Analy	sis year	2045
Add to Totals worksheet	Restore equations		Reset input cells
Output Summary Predicted cras	h frequency, crashes / ye	ear	Combined CMF
<u> </u>	PDO Total		F+I PDO
Total crashes 1.291	1.769 3.060		hicle crashes 0.517 0.517
Multiple-vehicle crashes 0.749 Single-vehicle crashes 0.472	1.173 0.596	Single-ver	hicle crashes 2.273 2.273
Vehicle-pedestrian crashes 0.045	0.590	Severity	distribution for F+I crashes
Vehicle-bicycle crashes 0.024		-	K A B C
Vollidio bioyale didense 0.02 i		0.03	
Input Data	<u>Value</u>	<u>Advisory</u>	Messages
Basic Roadway Data			
Area type	Suburban		
Segment type	6D	•	
Segment length, mi	0.31	•	
Annual average daily traffic (AADT), veh/day Number of highway-rail grade crossings present	38803	•	
Posted speed limit, mi/h	50	•	
Automated speed enforcement present?	No		
Access Data			
Driveway count Major commercial	0		
Major industrial	0		
Minor	0		
Cross Section Data			
Lane width, ft	12		
Outside shoulder width, ft	1		
Median width, ft	20		
Median barrier present?	Yes	•	
Roadside Data			
Roadside fixed object count	9	29 objec	cts per mile.
Average roadside fixed object offset, ft	<u>4</u>	•	Default Values
Calibration Factors	<u>Value</u>		<u>Default Values</u>
Local calibration factor (C)	1.000		1.000
Adjustment factor for pedestrians (f_{ped})	0.015		0.015
Adjustment factor for bicyclists (f _{bike})	0.008		0.008
Severity distribution calibration factor ($C_{sdf,tws}$)	1.000		1.000
Crash Modification Factors	F+I Multiple Single	<u>.</u>	PDO Multiple Single
Lane width		.000	1.000 1.000
Outside shoulder width		.014	1.014 1.014
Median width		.972	0.972 0.972
Median barrier		.967	0.600 1.967
Highway-rail grade crossing		.000	1.000 1.000
Major commercial driveways	0.932		0.932
Major industrial driveways	0.989		0.989
Minor driveways Automated speed enforcement	0.947 1.000 1	.000	0.947 1.000 1.000
		1.11.11.11	

Safety Prediction Worksheet	tor Urban an	d Suburb						
General Information		_	<u>S</u>	ite Infor	rmation			
Analyst TL				•	eet name	Sam Eig Hw		
Agency ATCS					eet name	Diamondbac	k Dr	
Date 1/31/2022					ion number	2		
Location Montgomery County	/		Α	nalysis	year	2045		
Add to Totals worksheet		Res	store equation	ns		Rese	et input cells	
Output Summary	Predicted ci F+I	rash frequ PDO	ency, crashe Total	s / year		С	ombined C F+I	MF PDO
Total crashe	es 6.367	5.378	11.745		Total-vehic	cle crashes	0.937	0.937
Total-vehicle crashe	es 5.886	5.378		Veh	nicle-pedestri	an crashes	4.150	
Vehicle-pedestrian crashe Vehicle-bicycle crashe						istribution for	F+I crashes	
					0.028	0.266	1.541	4.533
Input Data			<u>Value</u>		Advisory N	<u>Messages</u>		
Intersection Data			Cude under eine					
Area type			Suburban 4		ASC into-	eaction time		
Number of legs Traffic control type			4 Signalized		43G Inters	section type		
Lighting present?			Yes		- :			
Red-light cameras present?			No		.			
Daily pedestrian volume crossi	ng all legs (pe	ds/day)	151					
Maximum number of lanes cros			8					
Number of bus stops within 1,0			3		·			
School(s) present within 1,000 Alcohol sales establishments w		on'?	No 0					
Street Data	7,000 it		-	1inor				
Street configuration Annual average daily traffic (AA Number of through lanes	ADT), veh/day		Two-way T 38519 6	wo-way 1946		ection config	guration	
Number of approaches with left	t-turn lanes		2		1			
Number of left-turn movements		d phasing	2		1.			
Number of right-turn movemen	ts prohibited o	n red	0		1.			
Number of U-turn movements			2		0.			
Number of approaches with rig	ht-turn channe	elization	2		1.			
Calibration Factors			<u>Value</u>			<u>Default Value</u>	<u>es</u>	
Local calibration factor (C)			1.000			1.000		
Adjustment factor for pedestria	ns for stop cor	ntrol (f_{ped})	0.049			0.049		
Adjustment factor for bicyclists	(f _{bike})		0.019			0.019		
Severity distribution calibration	factor, 2-way	(C _{sdf,twi})	1.000			1.000		
Severity distribution calibration	factor, 1-way	(C _{sdf,owi})	1.000			1.000		
Probability of fatality given K+A			0.094			0.094		
			Manne	er of Co	llision Propor	tions		
2x2 intersections	3ST, F+I 3	ST, PDO				4ST, PDO 4	SG, F+I 45	SG, PDO
Rear-end collision proportion	0.094	0.154	0.120	0.18	_		0.083	0.148
Angle colllision proportion	0.764	0.629	0.676	0.55	0.806	0.707	0.746	0.552
1x2 or 1x1 intersections						4ST, PDO 4		
Rear-end collision proportion	0.100	0.100	0.111	0.14	_		0.030	0.059
Angle colllision proportion	0.300	0.250		0.57	0.822		0.837	0.733
<u>Crash Modification Factors</u> Total-vehicle crash CMFs			F+I			PDO		
Lighting			0.911			0.911		
Red-light cameras			1.000			1.000		
Left-turn signal phasing			0.636			0.636		
Right-turn-on-red			0.980			0.980		
U-turn prohibition			0.922			0.922		
Right-turn channelization			1.545			1.545		
Number of lanes			1.159			1.159		
	•							
Vehicle-hedestrian crash ("""								
Vehicle-pedestrian crash CMFs Bus stops	•		4.150					
Bus stops Schools	•		4.150 1.000					

General Information	Site In	formation	
Analyst TL	Street	number	I-370
Agency ATCS	Street	name	Sam Eig Hwy from Diamondbacl
Date 1/31/2022	Segme	ent number	2
Location Montgomery County	Analys	sis year	2045
Add to Totals worksheet	Restore equations		Reset input cells
Output Summary Predicted cras	sh frequency, crashes / ye	ar	Combined CMF
F+/	PDO Total		F+I PDO
Total crashes 0.272	0.372 0.644		nicle crashes 0.557 0.557
Multiple-vehicle crashes 0.155 Single-vehicle crashes 0.103	0.243 0.130	Single-ver	nicle crashes 2.564 2.564
Vehicle-pedestrian crashes 0.009	0.130	Severity	distribution for F+I crashes
Vehicle-bicycle crashes 0.005		-	K A B C
vernete prefete diagnes <u>versee</u>		0.00	
Input Data	<u>Value</u>	Advisory	<u>Messages</u>
Basic Roadway Data			
Area type	Suburban	•	
Segment type	6D	•	
Segment length, mi	0.06	•	
Annual average daily traffic (AADT), veh/day Number of highway-rail grade crossings presen	38508 t	•	
Posted speed limit, mi/h	50	•	
Automated speed enforcement present?	No		
Access Data			
Driveway count Major commercial	0		
Major industrial	0		
Minor	0		
Cross Section Data			
Lane width, ft	12		
Outside shoulder width, ft	1		
Median width, ft	7		
Median barrier present?	Yes	•	
Roadside Data			
Roadside fixed object count	3	50 objec	cts per mile.
Average roadside fixed object offset, ft	6	•	Default Values
Calibration Factors	<u>Value</u>		<u>Default Values</u>
Local calibration factor (C)	1.000		1.000
Adjustment factor for pedestrians (f_{ped})	0.015		0.015
Adjustment factor for bicyclists (f _{bike})	0.008		0.008
Severity distribution calibration factor ($C_{sdf,tws}$)	1.000		1.000
Crash Modification Factors	F+I Multiple Single		PDO Multiple Single
Lane width		.000	1.000 1.000
Outside shoulder width		.014	1.014 1.014
Median width		.047	1.047 1.047
Median barrier		.967	0.600 1.967
Highway-rail grade crossing		.000	1.000 1.000
Major commercial driveways	0.932		0.932
Major industrial driveways	0.989		0.989
Minor driveways	0.947		0.947
Automated speed enforcement	1.000 1.	.000	1.000 1.000

Safety Prediction Worksheet	for Urban an	nd Suburb	an Arterial I	ntersect	ions			
General Information				Site Infor	<u>mation</u>			
Analyst TL			_		eet name	Sam Eig H	MV	
Agency ATCS				•	eet name	Fields Rd		
Date 1/31/2022					on number	3		
Location Montgomery County			A	Analysis	year	2045		
Add to Totals worksheet		Res	store equation	ns		Res	set input cells	
Output Summary	Predicted o	rash frequ PDO	ency, crashe Total	s / year			Combined Ci F+I	MF PDO
Total crashe		3.044			Total-vehi	cle crashes	0.857	0.857
Total-vehicle crashe		3.044		Veh	icle-pedestri	an crashes	3.114	
Vehicle-pedestrian crashe	-				Carranitural	induibdin fo		
Vehicle-bicycle crashe	es 0.182				Severity a. K		r F+I crashes B	C
					0.020		0.958	2.362
Input Data			<u>Value</u>		Advisory N	<u>/lessages</u>		
Intersection Data			Outered		-			
Area type			Suburban		286 into-	coetion terr	•	
Number of legs Traffic control type			3 Signalized			section type	5	
Lighting present?			Yes		.			
Red-light cameras present?			No					
Daily pedestrian volume crossii			151		ŀ			
Maximum number of lanes cros Number of bus stops within 1,0	, ,		11		•			
School(s) present within 1,000			No		·			
Alcohol sales establishments w			1] .			
Street Data			Major I	⁄linor				
Street configuration			Two-way	wo-way	2x2 inters	ection conf	figuration	
Annual average daily traffic (AA	ADT), veh/day	'	38177	1889				
Number of through lanes	. 4		6		<u>4</u> .			
Number of approaches with left Number of left-turn movements		d nhasing	1		1 1			
Number of right-turn movement	•		1		1.			
Number of U-turn movements p	rohibited		1		1.			
Number of approaches with rig	ht-turn channe	elization	1		1.			
Calibration Factors			<u>Value</u>			Default Val	<u>ues</u>	
Local calibration factor (C)			1.000			1.000		
Adjustment factor for pedestria	ns for stop co	ntrol (f_{ped})	0.051			0.051		
Adjustment factor for bicyclists			0.029			0.029		
Severity distribution calibration			1.000			1.000		
Severity distribution calibration			1.000			1.000		
Probability of fatality given K+A	severity ($P_{\kappa_{\parallel}}$	_{K+A})	0.094			0.094		
0.00 int	20T 5.1	207 202			lision Propoi		400 5:1 11	00 000
2x2 intersections Rear-end collision proportion	3S1, F+I 0.094	0.154		0.18			4SG, F+I 4S 0.083	0.148
Angle colllision proportion	0.764	0.629	0.676	0.10			0.746	0.552
1x2 or 1x1 intersections	3ST, F+I	3ST, PDO	3SG, F+1 3	SG, PD	O 4ST, F+I	4ST, PDO	4SG, F+I 4S	
Rear-end collision proportion	0.100	0.100	0.111	0.14	0.047	0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.57	1 0.822	0.706	0.837	0.733
Crash Modification Factors			F+I			PDO		
Total-vehicle crash CMFs								
Lighting			0.911			0.911		
Red-light cameras			1.000			1.000		
Left-turn signal phasing			0.740			0.740		
Right-turn-on-red			0.960			0.960		
U-turn prohibition			0.922			0.922		
Right-turn channelization			1.243			1.243		
Number of lanes			1.157			1.157		
Vehicle-pedestrian crash CMFs	3							
Bus stops			2.780					
Schools Alcohol sales establishments			1.000 1.120					
AICOHOL SAIES ESTABLISHITIENTS			1.120					

Safety Prediction Worksheet	for Urban an	d Suburb	an Arterial I	ntersect	ions			
General Information			5	Site Infor	<u>mation</u>			
Analyst TL					eet name	Shady Grov	ve Rd	
Agency ATCS				•	eet name	Corporate I		
Date 1/31/2022			I	ntersecti	on number	1		
Location Montgomery County	1		A	Analysis	year	2045		
Add to Totals worksheet		Res	store equation	ns		Res	set input cells	
Output Summary	Predicted c	rash frequ PDO	ency, crashe Total	s / year			Combined C F+I	MF PDO_
Total crashe		2.724				cle crashes	0.674	0.674
Total-vehicle crashe		2.724		Veh	icle-pedestri	an crashes	4.648	
Vehicle-pedestrian crashe Vehicle-bicycle crashe					Soverity d	istribution fo	r F+I crashes	
verlicie-bicycle crasile	55 0.106				Severity di K		i r+i crasiles B	C
					0.018		0.867	2.222
Input Data			<u>Value</u>		Advisory N	<u> lessages</u>		
Intersection Data			0 1 .		-			
Area type			Suburban		400 into in	acation to-		
Number of legs Traffic control type			4 Signalized		45G Inter	section type	e	
Lighting present?			Yes		 :			
Red-light cameras present?			No		i.			
Daily pedestrian volume crossi	• • •	• ,	161					
Maximum number of lanes cros			7					
Number of bus stops within 1,0			4 No		ŀ			
School(s) present within 1,000 Alcohol sales establishments w		OH?	1		<u>.</u>			
Street Data			Major N	Лinor	<u> </u>			
Street configuration				wo-way	Tava intere	ection conf	figuration	
Annual average daily traffic (A	ADT) veh/dav		38558	531		ection com	nguration	
Number of through lanes	,,,		6		2.			
Number of approaches with lef	t-turn lanes		2		1.			
Number of left-turn movements	•		0		2 .			
Number of right-turn movemen	•	n red	0		0.			
Number of U-turn movements produced Number of approaches with right		elization	0		<mark>0</mark> .			
Calibration Factors		J.I.Z.G.1.0.1.	<u>Value</u>		<u> </u>	Default Val	ues	
Local calibration factor (C)			1.000			1.000	<u> </u>	
Adjustment factor for pedestria	ns for stan as	otrol (f)	0.049			0.049		
		illi (i ped)	0.049					
Adjustment factor for bicyclists Severity distribution calibration		(C)	1.000			0.019		
Severity distribution calibration			1.000			1.000		
Probability of fatality given K+A			0.094			1.000 0.094		
		NTA /		er of Col	lision Propor			
2x2 intersections			3SG, F+1 3	SG, PD	O 4ST, F+I	4ST, PDO	4SG, F+I 45	
Rear-end collision proportion Angle colllision proportion	0.094	0.154 0.629	0.120 0.676	0.18			0.083 0.746	0.148 0.552
1x2 or 1x1 intersections							4SG, F+1 45	
Rear-end collision proportion	0.100	0.100	0.111	0.14		0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.57			0.837	0.733
Crash Modification Factors			F+I			PDO		
Total-vehicle crash CMFs								
Lighting			0.911			0.911		
Red-light cameras			1.000			1.000		
Left-turn signal phasing			0.740			0.740		
Right-turn-on-red			1.000			1.000		
U-turn prohibition			1.000			1.000		
Right-turn channelization			1.000			1.000		
Number of lanes			1.000			1.000		
Vehicle-pedestrian crash CMFs	S							
Bus stops			4.150					
Schools			1.000					
Alcohol sales establishments			1.120					

General Information	ban and Suburban Arte Site I	nformation_	-
Analyst TL		t number	Shady Grove Rd
Agency ATCS		t name	Corporate Blvd to I-270 SB Ram
Date 1/31/2022		nent number	1
Location Montgomery County	•	sis year	2045
Add to Totals worksheet	Restore equations		Reset input cells
·	n frequency, crashes / y	ear	Combined CMF
F+/	PDO Total	8.4 W. L	F+I PDO
Total crashes 0.255	0.348 0.603		nicle crashes 0.514 0.514
Multiple-vehicle crashes 0.143 Single-vehicle crashes 0.098	0.224	Single-ver	nicle crashes 2.446 2.446
Vehicle-pedestrian crashes 0.009	0.124	Severity	distribution for F+I crashes
Vehicle-bicycle crashes 0.005			K A B C
		0.00	
<u>Input Data</u>	<u>Value</u>	<u>Advisory</u>	Messages
Basic Roadway Data			
Area type	Suburban		
Segment type Segment length, mi	6D 0.06	•	
Annual average daily traffic (AADT), veh/day	38567	•	
Number of highway-rail grade crossings present	0	•	
Posted speed limit, mi/h	40		
Automated speed enforcement present?	No		
Access Data			
Driveway count Major commercial	0		
Major industrial	0		
Minor	0		
Cross Section Data			
Lane width, ft	11		
Outside shoulder width, ft	3		
Median width, ft	15		
Median barrier present?	Yes	•	
Roadside Data			
Roadside fixed object count	<u>6</u> 10	100 obje	cts per mile.
Average roadside fixed object offset, ft		•	Default Values
<u>Calibration Factors</u> Local calibration factor (C)	<u>Value</u>		1.000
Adjustment factor for pedestrians (f_{ped})	1.000 0.015		0.015
•			
Adjustment factor for bicyclists (f_{bike}) Severity distribution calibration factor ($C_{sdf.tws}$)	0.008 1.000		0.008
Crash Modification Factors	F+I		PDO
	Multiple Single		Multiple Single
Lane width		1.022	1.022 1.022
Outside shoulder width		0.958	0.958 0.958
Median width Median barrier		1.000 1.967	1.000 1.000 0.600 1.967
Highway-rail grade crossing		1.000	1.000 1.000
Major commercial driveways	0.932	1.000	0.932
Major industrial driveways	0.989		0.989
Minor driveways	0.947		0.947
Automated speed enforcement		1.000	1.000 1.000
Roadside fixed objects		1.270	1.270

Safety Prediction Worksheet for Two-Way Urd General Information		nformation
Analyst TL	·	number Shady Grove Rd
Agency ATCS		name I-270 SB Ramps to I-270 NB Ra
Date 1/31/2022		ent number 2
Location Montgomery County	•	sis year 2045
Add to Totals worksheet	Restore equations	Reset input cells
Output Summary Predicted crash	h frequency, crashes / ye	ear Combined CMF
F+I	PDO Total	F+I PDC
Total crashes 0.354	0.483 0.837	Multiple-vehicle crashes 0.514 0.514
Multiple-vehicle crashes 0.206 Single-vehicle crashes 0.130	0.319 0.163	Single-vehicle crashes 2.357 2.35
Vehicle-pedestrian crashes 0.012	0.103	Severity distribution for F+I crashes
Vehicle-bicycle crashes 0.007		K A B
vollidio biofalo diadrico cisco.		0.005 0.028 0.109 0.21
Input Data	<u>Value</u>	Advisory Messages
Basic Roadway Data		
Area type	Suburban	•
Segment type	6D	•
Segment length, mi Annual average daily traffic (AADT), veh/day	0.08 41009	•
Number of highway-rail grade crossings present	0	•
Posted speed limit, mi/h	40	•
Automated speed enforcement present?	No	:
Access Data		
Driveway count Major commercial	0	
Major industrial	0	
Minor	0	•
Cross Section Data		
Lane width, ft	12	
Outside shoulder width, ft	4	
Median width, ft	6	
Median barrier present?	Yes	•
Roadside Data		
Roadside fixed object count	3	38 objects per mile.
Average roadside fixed object offset, ft	4	
<u>Calibration Factors</u>	<u>Value</u>	Default Values
Local calibration factor (C)	1.000	1.000
Adjustment factor for pedestrians (f_{ped})	0.015	0.015
Adjustment factor for bicyclists (f _{bike})	0.008	0.008
Severity distribution calibration factor ($C_{sdf,tws}$)	1.000	1.000
Crash Modification Factors	F+1	PDO Multiple Single
Lane width	Multiple Single	Multiple Single .000 1.000 1.000
Outside shoulder width		.931 0.931 0.931
Median width		.053 1.053 1.053
Median barrier		.967 0.600 1.967
Highway-rail grade crossing		.000 1.000 1.000
Major commercial driveways	0.932	0.932
Major industrial driveways	0.989	0.989
Minor driveways	0.947	0.947
Automated speed enforcement		.000 1.000 1.000 .222 1.222
Roadside fixed objects		

General Information	Site I	nformation
Analyst TL		t number Shady Grove Rd
Agency ATCS		t name I-270 NB Ramps to Choke Cher
Date 1/31/2022	Segm	nent number 3
Location Montgomery County	Analy	sis year 2045
Add to Totals worksheet	Restore equations	Reset input cells
	h frequency, crashes / ye	
F+I	PDO Total	F+I PDC
Total crashes 0.666	0.913 1.580	Multiple-vehicle crashes 0.731 0.73
Multiple-vehicle crashes 0.444 Single-vehicle crashes 0.187	0.678 0.235	Single-vehicle crashes 2.387 2.38
Vehicle-pedestrian crashes 0.023	0.233	Severity distribution for F+I crashes
Vehicle-bicycle crashes 0.012		K A B
Vollidio Bioydio diadrico 0.012		0.010 0.053 0.205 0.399
Input Data	<u>Value</u>	Advisory Messages
Basic Roadway Data		
Area type	Suburban	•
Segment type	6D	•
Segment length, mi	0.11	•
Annual average daily traffic (AADT), veh/day	44341	•
Number of highway-rail grade crossings present	<u> </u>	•
Posted speed limit, mi/h Automated speed enforcement present?	No	•
Automated speed emorcement present?	INO	•
Access Data		
Driveway count Major commercial	1	9 major comm. driveways per mile.
Major industrial	0	
Minor	0	
Cross Section Data		
Lane width, ft	12	
Outside shoulder width, ft	1	
Median width, ft	15	
Median barrier present?	Yes	
Roadside Data		
Roadside fixed object count	8	73 objects per mile.
Average roadside fixed object offset, ft	10	•
Calibration Factors	<u>Value</u>	<u>Default Values</u>
Local calibration factor (C)	1.000	1.000
Adjustment factor for pedestrians (f_{ped})	0.015	0.015
Adjustment factor for bicyclists (f_{bike})	0.008	0.008
Severity distribution calibration factor ($C_{sdf,tws}$)	1.000	1.000
Crash Modification Factors	F+I	PDO
Longwidth	Multiple Single	
Lane width Outside shoulder width		.000
Median width		.014
Median barrier		1.000 1.000 1.967 0.600 1.967
Highway-rail grade crossing		1.000 1.000 1.000
Major commercial driveways	1.282	1.282
Major industrial driveways	0.989	0.989
Minor driveways	0.947	0.947
Automated speed enforcement		1.000 1.000
Roadside fixed objects		1.196

Safety Prediction Worksheet	for Urban an	d Suburb	an Arterial li	ntersect	ions			
General Information			5	ite Infor	mation			
Analyst TL			N	laior stre	eet name	Shady Gro	ve Rd	
Agency ATCS				•	eet name	Choke Che		
Date 1/31/2022			lı	ntersecti	on number	2		
Location Montgomery County	1		A	nalysis	year	2045		
Add to Totals worksheet		Res	store equation	ns		Re	set input cells	
Output Summary	Predicted c	rash frequ PDO	ency, crashe Total	s / year			Combined C	MF PDO
Total crashe	s 4.290	3.529			Total-vehic	cle crashes	0.731	0.731
Total-vehicle crashe		3.529		Veh	icle-pedestri	an crashes	4.150	
Vehicle-pedestrian crashe					0			
Vehicle-bicycle crashe	es 0.141				Severity di K	istribution 10 A	r F+I crashes B	C
					0.023		1.134	2.906
Input Data			<u>Value</u>		Advisory N	<u>lessages</u>		
Intersection Data			0.1.		_			
Area type			Suburban				_	
Number of legs Traffic control type			4 Signalized		45G inter	section typ	e	
Lighting present?			Yes		† .			
Red-light cameras present?			No					
Daily pedestrian volume crossi	• • • • • • • • • • • • • • • • • • • •	• ,	237					
Maximum number of lanes cros			8					
Number of bus stops within 1,0 School(s) present within 1,000			2 No		·			
Alcohol sales establishments w		DIT?	0		- :			
Street Data			Major N	1inor				
Street configuration				wo-way	2v2 inters	ection conf	figuration	
Annual average daily traffic (AA	NDT) veh/dav		42473	930:		ection com	nguration	
Number of through lanes	,,		6		4.			
Number of approaches with left	turn lanes		2		1 .			
Number of left-turn movements	•		0		2.			
Number of III turn movement	•	n red	0		<u>)</u> .			
Number of U-turn movements p Number of approaches with rigit		elization	0		<u>J</u> .			
Calibration Factors			Value		<u></u>	Default Val	ues	
Local calibration factor (C)			1.000			1.000		
Adjustment factor for pedestrial	ns for stop cor	ntrol (f .)	0.049			0.049		
Adjustment factor for bicyclists		iti (i ped)	0.049			0.049		
Severity distribution calibration		(C)	1.000			1.000		
Severity distribution calibration			1.000			1.000		
Probability of fatality given K+A			0.094			0.094		
, ,,,	> (i/ ir	,		er of Col	lision Propor			
2x2 intersections			3SG, F+1 3	SG, PD() 4ST, F+I	4ST, PDO	4SG, F+I 4S	
Rear-end collision proportion Angle colllision proportion	0.094	0.154 0.629	0.120 0.676	0.18			0.083 0.746	0.148 0.552
1x2 or 1x1 intersections							4SG, F+1 4S	
Rear-end collision proportion	0.100	0.100	0.111	0.14		0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.57			0.837	0.733
Crash Modification Factors			F+I			PDO		_
Total-vehicle crash CMFs								
Lighting			0.911			0.911		
Red-light cameras			1.000			1.000		
Left-turn signal phasing			0.740			0.740		
Right-turn-on-red			1.000			1.000		
U-turn prohibition			1.000			1.000		
Right-turn channelization			1.000			1.000		
Number of lanes			1.085			1.085		
Vehicle-pedestrian crash CMFs	3							
Bus stops			4.150					
Schools Alcohol sales establishments			1.000 1.000					
AICUTIOI SAICS ESTADIISTITTENTS			1.000					