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	2045 No Build Predicted Annual Crash Frequency (by Severity)			2045 Preferred Alternative Predicted Annual Crash Frequency (by Severity)			Change in Predicted Annual Crash Frequency		
		Fatal and Injury	PDO	Total	Fatal and Injury	PDO	Total	Fatal and Injury	PDO	Total
I-270 & East Spur & I-370	Freeway Segments	176.6	407.2	583.8	185.9	448.6	634.5	9.4	41.4	50.8
	Ramp Segments	221.3	201.8	423.1	27.9	45.2	73.2	-193.5	-156.6	-350.0
	Managed Lanes	0.0	0.0	0.0	17.7	47.7	65.4	17.7	47.7	65.4
	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**
I-270 West Spur	Freeway Segments	30.3	69.4	99.7	25.4	64.3	89.7	-4.9	-5.1	-10.0
	Ramp Segments	1.8	2.2	4.0	2.0	2.7	4.7	0.2	0.5	0.7
	Managed Lanes	0.0	0.0	0.0	3.8	10.3	14.1	3.8	10.3	14.1
	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**
I-495 in Maryland	Freeway Segments	143.8	363.3	507.0	145.0	367.0	512.0	1.3	3.7	5.0
	Ramp Segments	15.3	15.7	31.0	13.3	15.6	28.9	-2.0	-0.1	-2.1
	Managed Lanes	0.0	0.0	0.0	8.0	21.6	29.6	8.0	21.6	29.6
	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**
I-495 in Virginia & GWMP	Freeway Segments	35.1	89.9	125.1	38.9	98.0	137.0	3.8	8.0	11.9
	Ramp Segments	6.0	9.8	15.8	4.3	7.5	11.8	-1.6	-2.3	-4.0
	Managed Lanes	2.4	6.5	8.8	3.7	10.1	13.8	1.3	3.6	4.9
	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**
Study 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	2045 No Build Predicted Annual Crash Frequency (by Severity)			2045 Preferred Alternative Predicted Annual Crash Frequency (by Severity)			Change in Predicted Annual Crash Frequency		
		Fatal and Injury	PDO	Total	Fatal and Injury	PDO	Total	Fatal and Injury	PDO	Total
I-270 & East Spur	Freeway Segments	171.6	398.4	570.0	180.0	437.4	617.4	8.5	39.0	47.5
	Ramp Segments	221.0	201.5	422.5	27.3	44.2	71.5	-193.8	-157.3	-351.1
	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**
I-270 West Spur	Freeway Segments	30.3	69.4	99.7	25.4	64.3	89.7	-4.9	-5.1	-10.0
	Ramp Segments	1.8	2.2	4.0	2.0	2.7	4.7	0.2	0.5	0.7
	HOT Managed Lanes	0.0	0.0	0.0	3.8	10.3	14.1	3.8	10.3	14.1
	Subtotal	**32.1**	**71.6**	**103.7**	**31.2**	**77.3**	**108.5**	**-0.9**	**5.7**	**4.8**
I-495 in Maryland	Freeway Segments	143.8	363.3	507.0	145.0	367.0	512.0	1.3	3.7	5.0
	Ramp Segments	15.3	15.7	31.0	13.3	15.6	28.9	-2.0	-0.1	-2.1
	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**
I-495 in Virginia	Freeway Segments	34.2	88.2	122.4	37.9	96.0	134.0	3.7	7.8	11.6
	Ramp Segments	6.0	9.8	15.8	4.3	7.5	11.8	-1.6	-2.3	-4.0
	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
	Subtotal	**0.9**	**1.7**	**2.7**	**1.0**	**2.0**	**3.0**	**0.1**	**0.2**	**0.3**
I-370	Freeway Segments	5.0	8.8	13.8	5.9	11.2	17.1	0.9	2.4	3.3
	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 Area 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-Build Predicted Annual Crash Frequency (by Severity)			2045 Preferred Alternative Predicted Annual Crash Frequency (by Severity)			Change in Predicted Annual Crash Frequency (by Severity)		
			Fatal and Injury	PDO	Total	Fatal and Injury	PDO	Total	Fatal and Injury	PDO	Total
I-270 & East Spur	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									
	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	18.4	33.4	9.4	12.1	21.5	-5.6	-6.2	-11.9
	W. Gude Drive (New interchange w/ Direct Access to HOT Managed Lanes)	Adjacent Intersections	2.7	5.6	8.3	3.1	6.5	9.6	0.4	0.8	1.3
		Ramp Terminals	0.0	0.0	0.0	1.9	3.6	5.4	1.9	3.6	5.4
	MD 28 Montgomery Avenue	Adjacent Intersections	7.3	15.0	22.3	7.4	15.1	22.5	0.1	0.1	0.2
		Ramp Terminals	8.2	13.5	21.7	7.1	11.5	18.6	-1.1	-2.0	-3.1
	MD 189 Falls Road	Adjacent Intersections	2.8	6.3	9.1	2.9	6.4	9.3	0.1	0.1	0.2
		Ramp Terminals	0.3	1.1	1.4	0.3	0.7	1.0	0.0	-0.5	-0.5
	Wootton Parkway (New interchange w/ Direct Access to HOT Managed Lanes)	Adjacent Intersections	2.4	5.2	7.6	2.9	6.1	9.0	0.5	0.9	1.3
		Ramp Terminals	0.0	0.0	0.0	1.4	2.7	4.1	1.4	2.7	4.1
	Montrose Road	Adjacent Intersections	6.3	15.0	21.4	6.2	14.7	20.9	-0.1	-0.4	-0.5
		Ramp Terminals	4.0	5.3	9.3	2.9	5.0	7.8	-1.1	-0.4	-1.5
	Rockledge Blvd	Adjacent Intersections	3.0	4.8	7.8	3.0	4.9	7.9	0.0	0.1	0.1
		Ramp Terminals	6.5	13.3	19.8	7.1	14.4	21.5	0.7	1.1	1.7
	MD 187 Old Georgetown Rd (at I-270)	Adjacent Intersections	11.6	13.7	25.3	11.8	14.1	25.9	0.2	0.4	0.6
		Ramp Terminals	14.5	15.1	29.6	13.9	15.4	29.2	-0.7	0.2	-0.4
	I-370	Ramp Terminals	1.2	2.5	3.7	2.2	4.2	6.5	1.0	1.8	2.8
	Subtotal		**115.4**	**170.3**	**285.7**	**116.1**	**175.8**	**291.9**	**0.7**	**5.5**	**6.3**
I-270 West Spur	Westlake Terrace (Direct Access to HOT Managed Lanes)	Adjacent Intersections	3.0	6.2	9.2	3.8	7.5	11.3	0.7	1.3	2.1
		Ramp Terminals									
	Democracy Boulevard	Adjacent Intersections	8.4	9.1	17.5	8.6	9.4	18.0	0.3	0.3	0.5
		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**
I-495 in Maryland	MD 190 River Road / Cabin John Parkway (Direct Access to HOT Managed Lanes)	Adjacent Intersections	4.9	9.7	14.6	7.0	13.2	20.2	2.0	3.5	5.6
		Ramp Terminals	2.8	4.1	6.9	12.6	13.3	25.9	9.8	9.2	19.0
	MD 187 Old Georgetown Road (at I-495)	Adjacent Intersections	9.8	9.7	19.5	9.9	9.8	19.7	0.1	0.1	0.2
		Ramp Terminals	23.8	13.1	36.8	31.0	23.1	54.1	7.3	10.0	17.3
	MD 355 Rockville Pike	Adjacent Intersections	11.6	11.0	22.5	11.8	11.1	22.9	0.2	0.2	0.4
		Ramp Terminals									
	Subtotal		**52.8**	**47.5**	**100.4**	**72.2**	**70.5**	**142.7**	**19.4**	**22.9**	**42.4**
I-495 in Virginia	VA 193	Adjacent Intersections									
		Ramp Terminals	6.0	13.2	19.3	6.4	13.4	19.9	0.4	0.2	0.6
	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
I-270 & East Spur	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
	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
	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

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
I-270 West 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
	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
	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
	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
I-495 in Maryland	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
	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
	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
- 4.70 miles of C-D Roads along I-270 with three lanes

I-495 No Build

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

I-270 Preferred Alternative

- 0.53-mile section from I-370 to Shady Grove Road – MP 8.54 to 9.07
- 0.42-mile section from Shady Grove Road to Gude Drive – MP 7.79 to 8.21
- 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
- 0.24-mile section from Montrose Road to I-270 Y – MP 2.65 to 2.89
- 0.69 miles of C-D Roads and ramps with three lanes

I-495 Preferred Alternative

- 0.23-mile section from MD 190 to I-270 West Spur – MP 3.68 to 3.91
- 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

General Information

Project description:	ISATe_I-270 from MD 117 to I-370_No Build				
Analyst:	TL/PK	Date:	1/31/2022	Area type:	Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi)		1.520	
Last year of analysis:	2045				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
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 Segments

Number	Study Period Description	Number	Study Period Description
1	NB CD MP 7.24 - MP 7.05	21	0
2	NB CD MP 7.05 - MP 6.33	22	0
3	NB CD MP 6.33 - MP 5.89	23	0
4	NB CD MP 5.89 - MP 5.67	24	0
5	C1-1 Ramp from I-270 NB	25	0
6	C1-2 Ramp from I-270 NB	26	0
7	0	27	0
8	G6-4 Ramp from MD 117 to	28	0
9	G6-31 Ramp from MD 117	29	0
10	G6-32 Ramp from MD 117	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

Crossroad Ramp Terminals

Number	Config.	Control	Study Period Description
1	D3ex	Signal	I-270 NB at MD 117
2	D3en	One stop	I-270 SB at MD 117
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0

Output Summary

General Information

Project description:	ISATe_I-270 from MD 117 to I-370_No Build				
Analyst:	TL/PK	Date:	1/31/2022	Area type:	Urban
First year of analysis:	2027				
Last year of analysis:	2045				

Crash Data Description

Freeway segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp terminals	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	

Estimated Crash Statistics

Crashes for Entire Facility	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:	2611.7	10.3	31.7	183.0	609.8	1776.8
Estimated average crash freq. during Study Period, crashes/yr:	137.5	0.5	1.7	9.6	32.1	93.5

Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	6	1800.3	6.7	18.5	110.2	381.0	1283.9
Ramp segments, crashes:	9	562.5	3.5	10.5	56.1	154.1	338.3
Crossroad ramp terminals, crashes:	2	249.0	0.2	2.7	16.7	74.8	154.6

Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	137.5	0.5	1.7	9.6	32.1	93.5
	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
	2031	137.5	0.5	1.7	9.6	32.1	93.5
	2032	137.5	0.5	1.7	9.6	32.1	93.5
	2033	137.5	0.5	1.7	9.6	32.1	93.5
	2034	137.5	0.5	1.7	9.6	32.1	93.5
	2035	137.5	0.5	1.7	9.6	32.1	93.5
	2036	137.5	0.5	1.7	9.6	32.1	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	32.1	93.5
	2041	137.5	0.5	1.7	9.6	32.1	93.5
	2042	137.5	0.5	1.7	9.6	32.1	93.5
	2043	137.5	0.5	1.7	9.6	32.1	93.5
	2044	137.5	0.5	1.7	9.6	32.1	93.5
	2045	137.5	0.5	1.7	9.6	32.1	93.5
	2046						
	2047						
	2048						
	2049						
	2050						

Distribution of Crashes for Entire Facility

Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**C**	**PDO**
Multiple vehicle	Head-on crashes:	12.9	0.1	0.3	1.5	5.1	5.9
	Right-angle crashes:	108.2	0.3	1.4	8.2	33.3	65.1
	Rear-end crashes:	1395.4	5.9	18.0	104.1	348.6	918.8
	Sideswipe crashes:	472.7	1.3	3.8	21.8	72.2	373.7
	Other multiple-vehicle crashes:	92.3	0.5	1.6	9.0	27.1	54.0
	Total multiple-vehicle crashes:	2081.4	8.0	25.0	144.6	486.2	1417.5
Single vehicle	Crashes with animal:	7.0	0.0	0.0	0.1	0.4	6.4
	Crashes with fixed object:	390.4	1.7	4.8	27.6	88.8	267.5
	Crashes with other object:	47.8	0.1	0.3	1.6	5.3	40.6
	Crashes with parked vehicle:	7.8	0.0	0.1	0.5	1.6	5.6
	Other single-vehicle crashes	77.3	0.5	1.5	8.6	27.4	39.2
	Total single-vehicle crashes:	530.3	2.3	6.7	38.4	123.6	359.2
Total crashes:		2611.7	10.3	31.7	183.0	609.8	1776.8

Evaluation Site Summary

General Information

Project description:	ISATe_I-270 from I-370 to Shady Grove Rd_No Build				
Analyst:	TL/PK	Date:	1/31/2022	Area type:	Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi)		0.940	
Last year of analysis:	2045				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
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	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 Segments

Number	Study Period Description	Number	Study Period Description
1	NB CD MP 5.66 - MP 5.59	21	0
2	NB CD MP 5.59 - MP 5.41	22	C7-16 Ramp from I-370 to I
3	NB CD MP 5.41 - MP 4.92	23	G8-17 Ramp from I-270 SB
4	0	24	C2-81 Ramp from I-370 WB
5	NB CD MP 4.92 - MP 4.74	25	C2-82 Ramp from I-370 WB
6	SB CD MP 0.00 - MP 0.26	26	C2-83 Ramp from I-370 WB
7	SB CD MP 0.26 - MP 0.45	27	C3-91 Ramp from I-370 EB
8	SB CD MP 0.45 - MP 0.73	28	C3-92 Ramp 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 0.82 - MP 0.90	30	C7-150 Ramp from I-370 W
11	C1-5 Ramp from I-270 NB t	31	C7-151 Ramp from I-370 W
12	C1-6 Ramp from I-270 to I-	32	0
13	C1-7 Ramp from I-270 to I-	33	0
14	0	34	0
15	0	35	0
16	C4-10 Ramp from I-270 NB	36	0
17	C4-11 Ramp from I-270 NB	37	0
18	G5-12 Ramp from I-270 SB	38	0
19	G5-13 Ramp from I-270 SB	39	0
20	C6-14 Ramp from I-370 EB	40	0

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
6	0	0	0

Output Summary

General Information					
Project description:	ISATe_I-270 from I-370 to Shady Grove Rd_No Build				
Analyst:	TL/PK	Date:	1/31/2022	Area type:	Urban
First year of analysis:	2027				
Last year of analysis:	2045				

Crash Data Description				
Freeway segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp terminals	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	

Estimated Crash Statistics							
Crashes for Entire Facility		**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:		1928.0	10.6	31.3	179.6	486.1	1220.3
Estimated average crash freq. during Study Period, crashes/yr:		101.5	0.6	1.6	9.5	25.6	64.2
Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	4	764.5	3.0	8.3	54.5	172.5	526.2
Ramp segments, crashes:	27	1163.6	7.6	23.1	125.2	313.6	694.2
Crossroad ramp terminals, crashes:	0	0.0	0.0	0.0	0.0	0.0	0.0
Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	101.5	0.6	1.6	9.5	25.6	64.2
	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	1.6	9.5	25.6	64.2
	2032	101.5	0.6	1.6	9.5	25.6	64.2
	2033	101.5	0.6	1.6	9.5	25.6	64.2
	2034	101.5	0.6	1.6	9.5	25.6	64.2
	2035	101.5	0.6	1.6	9.5	25.6	64.2
	2036	101.5	0.6	1.6	9.5	25.6	64.2
	2037	101.5	0.6	1.6	9.5	25.6	64.2
	2038	101.5	0.6	1.6	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	1.6	9.5	25.6	64.2
	2044	101.5	0.6	1.6	9.5	25.6	64.2
	2045	101.5	0.6	1.6	9.5	25.6	64.2
	2046						
	2047						
	2048						
	2049						
	2050						

Distribution of Crashes for Entire Facility

Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**C**	**PDO**
Multiple vehicle	Head-on crashes:	13.2	0.1	0.3	1.9	4.9	6.0
	Right-angle crashes:	18.9	0.1	0.4	2.2	6.2	10.0
	Rear-end crashes:	993.7	6.1	18.0	102.6	277.9	589.0
	Sideswipe crashes:	382.7	1.2	3.5	20.4	56.1	301.4
	Other multiple-vehicle crashes:	127.9	1.0	2.9	15.7	40.4	68.0
	Total multiple-vehicle crashes:	1536.4	8.5	25.1	142.8	385.5	974.4
Single vehicle	Crashes with animal:	3.9	0.0	0.0	0.1	0.3	3.4
	Crashes with fixed object:	293.5	1.5	4.5	26.4	72.2	188.9
	Crashes with other object:	27.1	0.1	0.2	1.2	3.5	22.1
	Crashes with parked vehicle:	5.4	0.0	0.1	0.5	1.3	3.4
	Other single-vehicle crashes	61.9	0.5	1.5	8.6	23.3	28.0
	Total single-vehicle crashes:	391.7	2.1	6.2	36.9	100.6	245.9
Total crashes:		1928.0	10.6	31.3	179.6	486.1	1220.3

Evaluation Site Summary

General Information

Project description:	I-270 I-495 Managed Lanes Study_2045 No Build_I-270 from Shady Grove Road to Gude Drive				
Analyst:	TL/PK	Date:	1/31/2022	Area type:	Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi)		0.810	
Last year of analysis:	2045				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
1	8	0.130	GP MP 8.39 - MP 8.26
2	9	0.280	GP MP 8.26 - MP 7.98
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	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 Segments

Number	Study Period Description	Number	Study Period Description
1	NB CD MP 4.74 - MP 4.67	21	0
2	NB CD MP 4.67 - MP 4.55	22	0
3	NB CD MP 4.55 - MP 3.92	23	0
4	SB CD MP 0.90 - MP 1.08	24	0
5	SB CD MP 1.08 - MP 1.42	25	0
6	SB CD MP 1.42 - MP 1.68	26	0
7	C2-18 Ramp from Shady G	27	0
8	C3-19 Ramp from Shady G	28	0
9	C4-20 Ramp from I-270 NB	29	0
10	C4-21 Ramp from I-270 NB	30	0
11	C6-22 Ramp from Shady G	31	0
12	C7-23 Ramp from Shady G	32	0
13	C8-24 Ramp from I-270 SB	33	0
14	C9-25 Ramp from I-270 NB	34	0
15	C10-26 Ramp from I-270 S	35	0
16	C10-27 Ramp from I-270 S	36	0
17	0	37	0
18	0	38	0
19	0	39	0
20	0	40	0

Crossroad Ramp Terminals

Number	Config.	Control	Study Period Description
1	D3ex	Signal	Shady Grove Road at I-270 NB
2	D3ex	Signal	Shady Grove Road at I-270 SB
3	D3ex	One stop	Omega Dr Fileds Road at I-270 SB
4	D3ex	Signal	Piccard Dr Redland Blvd at I-270 NB
5	0	0	0
6	0	0	0

Output Summary							
General Information							
Project description:	I-270 I-495 Managed Lanes Study_2045 No Build_I-270 from Shady Grove Road to Gude Drive						
Analyst:	TL/PK	Date:	1/31/2022	Area type:	Urban		
First year of analysis:	2027						
Last year of analysis:	2045						
Crash Data Description							
Freeway segments	Segment crash data available?		No	First year of crash data:			
	Project-level crash data available?		No	Last year of crash data:			
Ramp segments	Segment crash data available?		No	First year of crash data:			
	Project-level crash data available?		No	Last year of crash data:			
Ramp terminals	Segment crash data available?		No	First year of crash data:			
	Project-level crash data available?		No	Last year of crash data:			
Estimated Crash Statistics							
Crashes for Entire Facility		**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:		2405.1	11.1	42.0	236.1	740.1	1375.9
Estimated average crash freq. during Study Period, crashes/yr:		126.6	0.6	2.2	12.4	39.0	72.4
Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	3	835.9	2.8	7.7	54.0	188.3	583.2
Ramp segments, crashes:	16	935.2	7.8	23.7	125.3	334.6	443.8
Crossroad ramp terminals, crashes:	4	634.0	0.5	10.6	56.8	217.2	348.9
Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	126.6	0.6	2.2	12.4	39.0	72.4
	2028	126.6	0.6	2.2	12.4	39.0	72.4
	2029	126.6	0.6	2.2	12.4	39.0	72.4
	2030	126.6	0.6	2.2	12.4	39.0	72.4
	2031	126.6	0.6	2.2	12.4	39.0	72.4
	2032	126.6	0.6	2.2	12.4	39.0	72.4
	2033	126.6	0.6	2.2	12.4	39.0	72.4
	2034	126.6	0.6	2.2	12.4	39.0	72.4
	2035	126.6	0.6	2.2	12.4	39.0	72.4
	2036	126.6	0.6	2.2	12.4	39.0	72.4
	2037	126.6	0.6	2.2	12.4	39.0	72.4
	2038	126.6	0.6	2.2	12.4	39.0	72.4
	2039	126.6	0.6	2.2	12.4	39.0	72.4
	2040	126.6	0.6	2.2	12.4	39.0	72.4
	2041	126.6	0.6	2.2	12.4	39.0	72.4
	2042	126.6	0.6	2.2	12.4	39.0	72.4
	2043	126.6	0.6	2.2	12.4	39.0	72.4
	2044	126.6	0.6	2.2	12.4	39.0	72.4
	2045	126.6	0.6	2.2	12.4	39.0	72.4
	2046						
	2047						
	2048						
	2049						
	2050						
Distribution of Crashes for Entire Facility							
Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**C**	**PDO**
Multiple vehicle	Head-on crashes:	17.6	0.1	0.5	2.5	7.9	6.6
	Right-angle crashes:	176.1	0.3	3.2	17.6	65.9	89.2
	Rear-end crashes:	1290.7	6.3	24.4	138.0	437.3	684.6
	Sideswipe crashes:	382.8	1.2	3.9	22.9	70.5	284.3
	Other multiple-vehicle crashes:	120.1	1.0	3.0	16.4	46.5	53.2
	Total multiple-vehicle crashes:	1987.3	8.9	35.0	197.4	628.1	1117.8
Single vehicle	Crashes with animal:	4.2	0.0	0.0	0.1	0.3	3.7
	Crashes with fixed object:	311.9	1.6	5.0	27.6	79.8	198.0
	Crashes with other object:	28.0	0.1	0.2	1.2	3.7	22.9
	Crashes with parked vehicle:	6.3	0.0	0.1	0.5	1.5	4.1
	Other single-vehicle crashes	67.5	0.5	1.7	9.3	26.6	29.4
	Total single-vehicle crashes:	417.9	2.2	6.9	38.7	112.0	258.1
	Total crashes:	2405.1	11.1	42.0	236.1	740.1	1375.9

Evaluation Site Summary

General Information

Project description:	ISATe_I-270 from Gude Dr to MD 28_No Build				
Analyst:	TL	Date:	1/31/2022	Area type:	Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi)		1.080	
Last year of analysis:	2045				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
1	9	0.200	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	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 Segments

Number	Study Period Description	Number	Study Period Description
1	NB CD MP 3.92 - MP 3.62	21	0
2	NB CD MP 3.62 - MP 3.03	22	0
3	NB CD MP 3.03 - MP 2.99	23	0
4	NB CD MP 2.99 - MP 2.83	24	0
5	NB CD MP 2.83 - MP 2.82	25	0
6	SB CD MP 1.68 - MP 1.84	26	0
7	SB CD MP 1.84 - MP 2.41	27	0
8	SB CD MP 2.41 - MP 2.52	28	0
9	SB CD MP 2.52 - MP 2.67	29	0
10	SB CD MP 2.67 - MP 2.76	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

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
6	0	0	0

Output Summary

General Information

Project description:	ISATe_I-270 from Gude Dr to MD 28_No Build				
Analyst:	TL	Date:	1/31/2022	Area type:	Urban
First year of analysis:	2027				
Last year of analysis:	2045				

Crash Data Description

Freeway segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp terminals	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	

Estimated Crash Statistics

Crashes for Entire Facility	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes 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**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	5	1251.4	3.8	10.5	75.4	285.9	875.7
Ramp segments, crashes:	10	1091.9	8.2	24.9	134.9	381.4	542.5
Crossroad ramp terminals, crashes:	0	0.0	0.0	0.0	0.0	0.0	0.0

Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	123.3	0.6	1.9	11.1	35.1	74.6
	2028	123.3	0.6	1.9	11.1	35.1	74.6
	2029	123.3	0.6	1.9	11.1	35.1	74.6
	2030	123.3	0.6	1.9	11.1	35.1	74.6
	2031	123.3	0.6	1.9	11.1	35.1	74.6
	2032	123.3	0.6	1.9	11.1	35.1	74.6
	2033	123.3	0.6	1.9	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	1.9	11.1	35.1	74.6
	2040	123.3	0.6	1.9	11.1	35.1	74.6
	2041	123.3	0.6	1.9	11.1	35.1	74.6
	2042	123.3	0.6	1.9	11.1	35.1	74.6
	2043	123.3	0.6	1.9	11.1	35.1	74.6
	2044	123.3	0.6	1.9	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 Crashes for Entire Facility

Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**C**	**PDO**
Multiple vehicle	Head-on crashes:	15.1	0.1	0.4	2.3	6.8	5.5
	Right-angle crashes:	28.1	0.2	0.5	2.9	9.7	14.9
	Rear-end crashes:	1286.1	7.3	21.7	127.5	400.1	729.4
	Sideswipe crashes:	458.3	1.5	4.3	25.6	82.0	344.9
	Other multiple-vehicle crashes:	141.1	1.1	3.4	18.7	54.4	63.6
	Total multiple-vehicle crashes:	1928.8	10.2	30.2	177.0	553.1	1158.4
Single vehicle	Crashes with animal:	4.8	0.0	0.0	0.1	0.4	4.3
	Crashes with fixed object:	304.7	1.3	3.7	23.9	81.8	193.9
	Crashes with other object:	35.5	0.1	0.2	1.3	4.8	29.1
	Crashes with parked vehicle:	6.0	0.0	0.1	0.5	1.6	3.9
	Other single-vehicle crashes	63.4	0.4	1.2	7.6	25.6	28.7
	Total single-vehicle crashes:	414.4	1.8	5.2	33.3	114.2	259.9
Total crashes:		2343.2	12.0	35.4	210.3	667.2	1418.2

Evaluation Site Summary

General Information

Project description:	I-270 I-495 Managed Lanes Study_2045 No Build_I-270 from MD 28 to MD 189						
Analyst:	TL/PK		Date:	1/31/2022	Area type:		Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi)			0.970		
Last year of analysis:	2045						

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
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 Segments

Number	Study Period Description		Number	Study Period Description
1	NB CD MP 2.82 - MP 2.77		21	0
2	NB CD MP 2.77 - MP 2.64		22	0
3	NB CD MP 2.64 - MP 2.46		23	0
4	NB CD MP 2.46 - MP 2.28		24	0
5	NB CD MP 2.28 - MP 2.02		25	0
6	NB CD MP 2.02 - MP 1.87		26	0
7	SB CD MP 2.76 - MP 2.89		27	0
8	SB CD MP 2.89 - MP 3.23		28	0
9	SB CD MP 3.23 - MP 3.59		29	0
10	SB CD MP 3.59 - MP 3.76		30	0
11	C1-28 Ramp from I-270 NB		31	0
12	C2-29 Ramp from MD 28 W		32	0
13	C3-30 Ramp from MD 28 E		33	0
14	C4-31.1 Ramp from I-270 N		34	0
15	C4-31.2 Ramp from I-270 N		35	0
16	C5-32.1 Ramp from I-270 S		36	0
17	C5-32.2 Ramp from I-270 S		37	0
18	C6-33 Ramp from MD 28 E		38	0
19	C7-34 Ramp from MD 28 W		39	0
20	0		40	0

Crossroad Ramp Terminals

Number	Config.	Control	Study Period Description
1	D3ex	Signal	MD 28 at I-270 NB
2	D3ex	Signal	MD 28 at I-270 SB
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0

Output Summary

General Information					
Project description:	I-270 I-495 Managed Lanes Study_2045 No Build_I-270 from MD 28 to MD 189				
Analyst:	TL/PK	Date:	1/31/2022	Area type:	Urban
First year of analysis:	2027				
Last year of analysis:	2045				

Crash Data Description				
Freeway segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp terminals	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	

Estimated Crash Statistics							
Crashes for Entire Facility		**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:		2856.1	14.9	51.4	291.6	854.9	1643.3
Estimated average crash freq. during Study Period, crashes/yr:		150.3	0.8	2.7	15.3	45.0	86.5
Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	4	1117.0	3.4	9.4	67.6	253.0	783.6
Ramp segments, crashes:	19	1327.2	11.2	33.9	183.9	494.2	604.0
Crossroad ramp terminals, crashes:	2	411.9	0.3	8.0	40.1	107.8	255.8
Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	150.3	0.8	2.7	15.3	45.0	86.5
	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
	2038	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	0.8	2.7	15.3	45.0	86.5
	2046						
	2047						
	2048						
	2049						
	2050						

Distribution of Crashes for Entire Facility

Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**C**	**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	2.6	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-vehicle crashes:	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
	Crashes with fixed object:	358.6	1.7	5.3	32.0	93.0	226.5
	Crashes with other object:	33.8	0.1	0.2	1.4	4.5	27.7
	Crashes with parked vehicle:	7.0	0.0	0.1	0.6	1.8	4.5
	Other single-vehicle crashes	76.7	0.6	1.8	10.6	30.1	33.7
	Total single-vehicle crashes:	481.2	2.4	7.4	44.7	129.8	296.9
Total crashes:		2856.1	14.9	51.4	291.6	854.9	1643.3

Evaluation Site Summary

General Information

Project description:	ISATe_I-270 from MD 189 to Wootton Pkwy_No Build				
Analyst:	TL	Date:	1/31/2022	Area type:	Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi)		0.600	
Last year of analysis:	2045				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
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	0	0.000	0

Ramp Segments

Number	Study Period Description	Number	Study Period Description
1	NB CD MP 1.87 - MP 1.74	21	0
2	NB CD MP 1.74 - MP 1.25	22	0
3	SB CD MP 3.76 - MP 4.04	23	0
4	SB CD MP 4.04 - MP 4.33	24	0
5	C1-35 Ramp from I-270 NB	25	0
6	C2-36 Ramp from MD 189	26	0
7	C3-37 Ramp from MD 189	27	0
8	C3-38 Ramp from MD 189	28	0
9	C4-39 Ramp from I-270 NB	29	0
10	C4-40 Ramp from I-270 NB	30	0
11	C5-41 Ramp from I-270 SB	31	0
12	C6-42 Ramp from MD 189	32	0
13	C7-43 Ramp from MD 189	33	0
14	C7-44 Ramp from MD 189	34	0
15	C8-45 Ramp from I-270 SB	35	0
16	C8-46 Ramp from I-270 SB	36	0
17	0	37	0
18	0	38	0
19	0	39	0
20	0	40	0

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
6	0	0	0

Output Summary							
General Information							
Project description:	ISATe_I-270 from MD 189 to Wootton Pkwy_No Build						
Analyst:	TL	Date:	1/31/2022	Area type:	Urban		
First year of analysis:	2027						
Last year of analysis:	2045						
Crash Data Description							
Freeway segments	Segment crash data available?		No	First year of crash data:			
	Project-level crash data available?		No	Last year of crash data:			
Ramp segments	Segment crash data available?		No	First year of crash data:			
	Project-level crash data available?		No	Last year of crash data:			
Ramp terminals	Segment crash data available?		No	First year of crash data:			
	Project-level crash data available?		No	Last year of crash data:			
Estimated Crash Statistics							
Crashes for Entire Facility		**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:		1757.2	13.3	39.8	223.2	652.2	828.8
Estimated average crash freq. during Study Period, crashes/yr:		92.5	0.7	2.1	11.7	34.3	43.6
Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	1	572.6	1.7	4.8	34.7	132.4	399.0
Ramp segments, crashes:	16	1184.5	11.5	34.9	188.5	519.8	429.8
Crossroad ramp terminals, crashes:	0	0.0	0.0	0.0	0.0	0.0	0.0
Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	92.5	0.7	2.1	11.7	34.3	43.6
	2028	92.5	0.7	2.1	11.7	34.3	43.6
	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	2.1	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						
	2050						
Distribution of Crashes for Entire Facility							
Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**C**	**PDO**
Multiple vehicle	Head-on crashes:	15.5	0.2	0.5	2.8	8.1	3.9
	Right-angle crashes:	18.3	0.1	0.4	2.5	7.9	7.3
	Rear-end crashes:	1004.4	8.5	25.5	142.6	417.6	410.2
	Sideswipe crashes:	316.6	1.6	4.8	27.1	80.3	202.8
	Other multiple-vehicle crashes:	146.1	1.5	4.6	25.1	70.9	44.0
	Total multiple-vehicle crashes:	1500.9	11.9	35.8	200.2	584.8	668.2
Single vehicle	Crashes with animal:	2.7	0.0	0.0	0.1	0.2	2.4
	Crashes with fixed object:	191.8	1.0	2.8	16.6	48.5	122.9
	Crashes with other object:	17.7	0.0	0.1	0.7	2.3	14.6
	Crashes with parked vehicle:	3.6	0.0	0.1	0.3	0.9	2.3
	Other single-vehicle crashes	40.5	0.3	0.9	5.4	15.4	18.5
	Total single-vehicle crashes:	256.3	1.3	4.0	23.0	67.4	160.6
Total crashes:		1757.2	13.3	39.8	223.2	652.2	828.8

Evaluation Site Summary

General Information

Project description:	ISATe_I-270 from Wootton Pkwy to Montrose Rd_No Build				
Analyst:	TL	Date:	1/31/2022	Area type:	Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi)		0.760	
Last year of analysis:	2045				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
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	0	0.000	0
19	0	0.000	0
20	0	0.000	0

Ramp Segments

Number	Study Period Description	Number	Study Period Description
1	NB CD MP 1.25 - MP 0.95	21	0
2	NB CD MP 0.95 - MP 0.70	22	0
3	NB CD MP 0.70 - MP 0.52	23	0
4	NB CD MP 0.52 - MP 0.48	24	0
5	SB CD MP 4.33 - MP 4.62	25	0
6	SB CD MP 4.62 - MP 4.84	26	0
7	SB CD MP 4.84 - MP 5.03	27	0
8	SB CD MP 5.03 - MP 5.09	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

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
6	0	0	0

Output Summary

General Information

Project description:	ISATe_I-270 from Wootton Pkwy to Montrose Rd_No Build				
Analyst:	TL	Date:	1/31/2022	Area type:	Urban
First year of analysis:	2027				
Last year of analysis:	2045				

Crash Data Description

Freeway segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp terminals	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	

Estimated Crash Statistics

Crashes for Entire Facility	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:	1978.5	12.8	36.3	212.8	652.3	1064.4
Estimated average crash freq. during Study Period, crashes/yr:	104.1	0.7	1.9	11.2	34.3	56.0

Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	3	957.9	3.5	8.2	60.4	220.3	665.6
Ramp segments, crashes:	8	1020.6	9.3	28.1	152.4	432.0	398.8
Crossroad ramp terminals, crashes:	0	0.0	0.0	0.0	0.0	0.0	0.0

Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	104.1	0.7	1.9	11.2	34.3	56.0
	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 Crashes for Entire Facility

Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**C**	**PDO**
Multiple vehicle	Head-on crashes:	14.6	0.2	0.4	2.5	7.4	4.2
	Right-angle crashes:	23.3	0.2	0.4	2.8	8.9	11.1
	Rear-end crashes:	1119.3	8.0	23.1	133.6	405.4	549.2
	Sideswipe crashes:	367.7	1.6	4.5	26.2	80.7	254.7
	Other multiple-vehicle crashes:	135.7	1.3	3.9	21.3	61.5	47.8
	Total multiple-vehicle crashes:	1660.7	11.2	32.3	186.4	563.9	866.9
Single vehicle	Crashes with animal:	4.0	0.0	0.0	0.1	0.3	3.5
	Crashes with fixed object:	233.9	1.1	2.9	19.0	63.7	147.2
	Crashes with other object:	26.7	0.1	0.1	1.0	3.6	21.8
	Crashes with parked vehicle:	4.7	0.0	0.1	0.4	1.3	3.0
	Other single-vehicle crashes	48.6	0.3	0.9	5.9	19.5	22.1
	Total single-vehicle crashes:	317.8	1.6	4.0	26.4	88.4	197.5
Total crashes:		1978.5	12.8	36.3	212.8	652.3	1064.4

Evaluation Site Summary

General Information

Project description:	ISATe_I-270 from Montrose Rd to I-270 Y_No Build				
Analyst:	TL	Date:	1/31/2022	Area type:	Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi)		1.470	
Last year of analysis:	2045				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
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	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 Segments

Number	Study Period Description	Number	Study Period Description
1	NB CD MP 0.48 - MP 0.42	21	C10-61 Ramp from I-270 N
2	NB CD MP 0.42 - MP 0.27	22	C2-481 Ramp from Montros
3	NB CD MP 0.27 - MP 0.00	23	0
4	SB CD MP 5.09 - MP 5.13	24	0
5	SB CD MP 5.13 - MP 5.29	25	0
6	SB CD MP 5.29 - MP 5.65	26	0
7	C1-47 Ramp from I-270 NB	27	0
8	C2-48 Ramp from Montrose	28	0
9	C2-49 Ramp from Montrose	29	0
10	C3-50 Ramp from Montrose	30	0
11	C4-51 Ramp from I-270 NB	31	0
12	C5-52 Ramp from I-270 SB	32	0
13	C6-53 Ramp from Montrose	33	0
14	C6-54 Ramp from Montrose	34	0
15	C6-55 Ramp from Montrose	35	0
16	C7-56 Ramp from Montrose	36	0
17	C8-57 Ramp from I-270 SB	37	0
18	C8-58 Ramp from I-270 SB	38	0
19	C9-59 Ramp from Tower O	39	0
20	C10-60 Ramp from I-270 N	40	0

Crossroad Ramp Terminals

Number	Config.	Control	Study Period Description
1	B2	Signal	I-270 NB at Tower Oaks Boulevard
2	0	0	0
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0

Output Summary						
General Information						
Project description:	ISATe_I-270 from Montrose Rd to I-270 Y_No Build					
Analyst:	TL	Date:	1/31/2022	Area type:	Urban	
First year of analysis:	2027					
Last year of analysis:	2045					
Crash Data Description						
Freeway segments	Segment crash data available?		No	First year of crash data:		
	Project-level crash data available?		No	Last year of crash data:		
Ramp segments	Segment crash data available?		No	First year of crash data:		
	Project-level crash data available?		No	Last year of crash data:		
Ramp terminals	Segment crash data available?		No	First year of crash data:		
	Project-level crash data available?		No	Last year of crash data:		

Estimated Crash Statistics							
Crashes for Entire Facility		**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:		2628.7	13.2	37.6	227.7	654.8	1695.4
Estimated average crash freq. during Study Period, crashes/yr:		138.4	0.7	2.0	12.0	34.5	89.2
Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	4	1917.3	8.1	17.1	126.9	434.3	1330.9
Ramp segments, crashes:	22	534.5	4.8	14.6	76.5	175.5	263.1
Crossroad ramp terminals, crashes:	1	176.9	0.2	5.9	24.2	45.1	101.4
Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	138.4	0.7	2.0	12.0	34.5	89.2
	2028	138.4	0.7	2.0	12.0	34.5	89.2
	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						
	2047						
	2048						
	2049						
	2050						

Distribution of Crashes for Entire Facility

Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**C**	**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	2.0	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	3.8	24.6	75.5	342.6
	Other multiple-vehicle crashes:	88.7	0.7	1.9	10.9	29.5	45.6
	Total multiple-vehicle crashes:	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 object:	463.4	2.7	6.7	42.1	120.0	291.9
	Crashes with other object:	55.0	0.1	0.3	2.3	7.4	44.8
	Crashes with parked vehicle:	8.8	0.1	0.1	0.8	2.3	5.6
	Other single-vehicle crashes	94.9	0.8	2.1	13.1	36.2	42.7
	Total single-vehicle crashes:	630.4	3.7	9.3	58.6	166.4	392.4
Total crashes:		2628.7	13.2	37.6	227.7	654.8	1695.4

Evaluation Site Summary

General Information

Project description:	ISATe_I-270 from I-270 Y to Rockledge Blvd_No Build				
Analyst:	TL	Date:	1/31/2022	Area type:	Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi)		0.810	
Last year of analysis:	2045				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
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 Segments

Number	Study Period Description	Number	Study Period Description
1	G-62 Ramp from I-270 SB t	21	0
2	H-63 Ramp from I-270 NB t	22	0
3	0	23	0
4	0	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

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
6	0	0	0

Output Summary							
General Information							
Project description:	ISATe_I-270 from I-270 Y to Rockledge Blvd_No Build						
Analyst:	TL	Date:	1/31/2022	Area type:	Urban		
First year of analysis:	2027						
Last year of analysis:	2045						
Crash Data Description							
Freeway segments	Segment crash data available?		No	First year of crash data:			
	Project-level crash data available?		No	Last year of crash data:			
Ramp segments	Segment crash data available?		No	First year of crash data:			
	Project-level crash data available?		No	Last year of crash data:			
Ramp terminals	Segment crash data available?		No	First year of crash data:			
	Project-level crash data available?		No	Last year of crash data:			
Estimated Crash Statistics							
Crashes for Entire Facility		**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:		620.6	2.8	7.9	48.6	140.5	420.9
Estimated average crash freq. during Study Period, crashes/yr:		32.7	0.1	0.4	2.6	7.4	22.2
Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	7	548.1	1.9	5.2	37.0	120.5	383.6
Ramp segments, crashes:	2	72.6	0.9	2.7	11.7	20.0	37.3
Crossroad ramp terminals, crashes:	0	0.0	0.0	0.0	0.0	0.0	0.0
Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	32.7	0.1	0.4	2.6	7.4	22.2
	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
	2042	32.7	0.1	0.4	2.6	7.4	22.2
	2043	32.7	0.1	0.4	2.6	7.4	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 Crashes for Entire Facility							
Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**C**	**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	0.1	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 crashes:	10.3	0.0	0.1	0.8	2.5	6.8
	Total multiple-vehicle crashes:	396.1	1.4	3.7	26.2	84.4	280.4
Single vehicle	Crashes with animal:	2.8	0.0	0.0	0.1	0.2	2.5
	Crashes with fixed object:	165.6	1.0	3.0	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
	Other single-vehicle crashes	34.2	0.3	1.0	5.2	12.5	15.1
	Total single-vehicle crashes:	224.6	1.4	4.1	22.5	56.0	140.5
Total crashes:		620.6	2.8	7.9	48.6	140.5	420.9

Evaluation Site Summary

General Information

Project description:	I-270 I-495 Managed Lanes Study_2045 No Build_I-270 from MD 187 to Rockledge Boulevard				
Analyst:	TL/PK	Date:	1/31/2022	Area type:	Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi)	0.290		
Last year of analysis:	2045				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
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 Segments

Number	Study Period Description	Number	Study Period Description
1	G2-66 Ramp from I-270 NB	21	0
2	G4-67 Ramp from Rockled	22	0
3	G3-64 Ramp from I-270 SB	23	0
4	G8-65 Ramp 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
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

Crossroad Ramp Terminals

Number	Config.	Control	Study Period Description
1	D4	Signal	Rockledge Boulevard at I-270 WB
2	D4	Signal	Rockledge Boulevard at I-270 EB
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0

Output Summary

General Information					
Project description:	I-270 I-495 Managed Lanes Study_2045 No Build_I-270 from MD 187 to Rockledge Boulevard				
Analyst:	TL/PK	Date:	1/31/2022	Area type:	Urban
First year of analysis:	2027				
Last year of analysis:	2045				

Crash Data Description				
Freeway segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp terminals	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	

Estimated Crash Statistics							
Crashes for Entire Facility		**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:		610.4	1.4	7.1	40.7	152.9	408.4
Estimated average crash freq. during Study Period, crashes/yr:		32.1	0.1	0.4	2.1	8.0	21.5
Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	3	163.6	0.6	1.6	11.2	35.0	115.2
Ramp segments, crashes:	4	70.5	0.6	1.9	8.1	19.9	39.8
Crossroad ramp terminals, crashes:	2	376.3	0.1	3.6	21.3	98.0	253.4
Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	32.1	0.1	0.4	2.1	8.0	21.5
	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
	2033	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	0.1	0.4	2.1	8.0	21.5
	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 Crashes for Entire Facility

Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**C**	**PDO**
Multiple vehicle	Head-on crashes:	3.7	0.0	0.1	0.3	1.3	2.0
	Right-angle crashes:	90.2	0.0	1.0	5.8	26.2	57.3
	Rear-end crashes:	307.4	0.5	3.3	20.3	82.2	201.2
	Sideswipe crashes:	75.6	0.1	0.4	2.5	9.1	63.4
	Other multiple-vehicle crashes:	11.1	0.0	0.1	0.6	2.1	8.2
	Total multiple-vehicle crashes:	488.0	0.7	4.8	29.5	120.9	332.1
Single vehicle	Crashes with animal:	1.0	0.0	0.0	0.0	0.1	0.9
	Crashes with fixed object:	92.1	0.5	1.6	7.9	22.4	59.6
	Crashes with other object:	7.3	0.0	0.1	0.3	0.9	6.0
	Crashes with parked vehicle:	1.9	0.0	0.0	0.1	0.4	1.3
	Other single-vehicle crashes	20.1	0.2	0.6	2.8	8.0	8.6
	Total single-vehicle crashes:	122.4	0.7	2.3	11.2	31.9	76.3
	Total crashes:	610.4	1.4	7.1	40.7	152.9	408.4

Evaluation Site Summary

General Information

Project description:	I-270 I-495 Managed Lanes Study_2045 No Build_I-270 from I-495 to MD 187						
Analyst:	TL/PK		Date:	1/31/2022	Area type:		Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi)			1.410		
Last year of analysis:	2045						

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
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 Segments

Number	Study Period Description	Number	Study Period Description
1	G2-68 Ramp from I-270 NB	21	0
2	G2-69 Ramp from I-270 NB	22	0
3	0	23	0
4	0	24	0
5	G4-72 Ramp from MD 187	25	0
6	G6-73 Ramp from I-270 SB	26	0
7	G6-74 Ramp from I-270 SB	27	0
8	0	28	0
9	G8-76 Ramp from MD 187	29	0
10	G8-77 Ramp from MD 187	30	0
11	G4-72.1 Ramp from MD 18	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

Crossroad Ramp Terminals

Number	Config.	Control	Study Period Description
1	D4	Signal	MD 187 at I-270 WB
2	D4	Signal	MD 187 at I-270 EB
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0

Output Summary

General Information

Project description:	I-270 I-495 Managed Lanes Study_2045 No Build_I-270 from I-495 to MD 187				
Analyst:	TL/PK	Date:	1/31/2022	Area type:	Urban
First year of analysis:	2027				
Last year of analysis:	2045				

Crash Data Description

Freeway segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp terminals	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	

Estimated Crash Statistics

Crashes for Entire Facility	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:	1529.1	4.0	16.7	109.5	452.2	946.7
Estimated average crash freq. during Study Period, crashes/yr:	80.5	0.2	0.9	5.8	23.8	49.8

Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	5	901.0	3.2	8.7	60.8	205.4	623.0
Ramp segments, crashes:	8	65.3	0.6	1.7	7.3	19.1	36.7
Crossroad ramp terminals, crashes:	2	562.9	0.3	6.3	41.4	227.8	287.0

Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	80.5	0.2	0.9	5.8	23.8	49.8
	2028	80.5	0.2	0.9	5.8	23.8	49.8
	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
	2031	80.5	0.2	0.9	5.8	23.8	49.8
	2032	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	0.9	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						
	2047						
	2048						
	2049						
	2050						

Distribution of Crashes for Entire Facility

Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**C**	**PDO**
Multiple vehicle	Head-on crashes:	7.7	0.0	0.1	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	8.9	60.1	257.2	491.4
	Sideswipe crashes:	223.7	0.4	1.5	10.0	37.4	174.4
	Other multiple-vehicle crashes:	27.1	0.1	0.3	1.9	7.0	17.9
	Total multiple-vehicle crashes:	1227.6	2.7	12.6	84.9	368.9	758.5
Single vehicle	Crashes with animal:	3.5	0.0	0.0	0.1	0.2	3.2
	Crashes with fixed object:	219.7	1.0	2.9	17.4	58.6	139.8
	Crashes with other object:	26.8	0.1	0.2	1.0	3.5	22.0
	Crashes with parked vehicle:	4.6	0.0	0.1	0.3	1.2	3.0
	Other single-vehicle crashes	47.0	0.3	1.0	5.7	19.8	20.2
	Total single-vehicle crashes:	301.5	1.3	4.1	24.6	83.3	188.2
Total crashes:		1529.1	4.0	16.7	109.5	452.2	946.7

Evaluation Site Summary

General Information

Project description:	I-270 I-495 Managed Lanes Study_2045 No Build_I-270 Y from Westlake Terrace to I-270				
Analyst:	TL/PK	Date:	1/31/2022	Area type:	Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi)		0.720	
Last year of analysis:	2045				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
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	0	0.000	0

Ramp Segments

Number	Study Period Description	Number	Study Period Description
1	H3-66 Ramp from Westlake	21	0
2	H5-67 Ramp from I-270 Y S	22	0
3	H-68 Ramp from I-270 SB t	23	0
4	0	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

Crossroad Ramp Terminals

Number	Config.	Control	Study Period Description
1	A2	Signal	Westlake Terrace at I-270Y
2	0	0	0
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0

Output Summary

General Information

Project description:	I-270 I-495 Managed Lanes Study_2045 No Build_I-270 Y from Westlake Terrace to I-270				
Analyst:	TL/PK	Date:	1/31/2022	Area type:	Urban
First year of analysis:	2027				
Last year of analysis:	2045				

Crash Data Description

Freeway segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp terminals	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	

Estimated Crash Statistics

Crashes for Entire Facility	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:	864.7	3.7	9.0	64.6	203.6	583.8
Estimated average crash freq. during Study Period, crashes/yr:	45.5	0.2	0.5	3.4	10.7	30.7

Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	4	741.7	3.4	7.1	53.0	163.7	514.6
Ramp segments, crashes:	3	27.4	0.3	0.8	4.4	7.4	14.5
Crossroad ramp terminals, crashes:	1	95.7	0.0	1.2	7.2	32.5	54.8

Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	45.5	0.2	0.5	3.4	10.7	30.7
	2028	45.5	0.2	0.5	3.4	10.7	30.7
	2029	45.5	0.2	0.5	3.4	10.7	30.7
	2030	45.5	0.2	0.5	3.4	10.7	30.7
	2031	45.5	0.2	0.5	3.4	10.7	30.7
	2032	45.5	0.2	0.5	3.4	10.7	30.7
	2033	45.5	0.2	0.5	3.4	10.7	30.7
	2034	45.5	0.2	0.5	3.4	10.7	30.7
	2035	45.5	0.2	0.5	3.4	10.7	30.7
	2036	45.5	0.2	0.5	3.4	10.7	30.7
	2037	45.5	0.2	0.5	3.4	10.7	30.7
	2038	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	0.5	3.4	10.7	30.7
	2041	45.5	0.2	0.5	3.4	10.7	30.7
	2042	45.5	0.2	0.5	3.4	10.7	30.7
	2043	45.5	0.2	0.5	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 Crashes for Entire Facility

Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**C**	**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	4.6	33.3	108.5	294.9
	Sideswipe crashes:	147.2	0.4	1.0	7.2	22.6	116.0
	Other multiple-vehicle crashes:	15.7	0.1	0.2	1.3	3.9	10.2
	Total multiple-vehicle crashes:	643.6	2.5	6.3	45.1	148.2	441.5
Single vehicle	Crashes with animal:	2.9	0.0	0.0	0.1	0.2	2.6
	Crashes with fixed object:	159.3	0.9	2.0	13.9	39.5	103.1
	Crashes with other object:	23.0	0.1	0.1	0.9	2.7	19.3
	Crashes with parked vehicle:	3.4	0.0	0.0	0.3	0.8	2.3
	Other single-vehicle crashes	32.5	0.3	0.6	4.3	12.2	15.0
	Total single-vehicle crashes:	221.1	1.2	2.8	19.4	55.4	142.4
Total crashes:		864.7	3.7	9.0	64.6	203.6	583.8

Evaluation Site Summary

General Information

Project description:	I-270 I-495 Managed Lanes Study_2045 No Build_I-270 Y from Democracy Blvd to Westlake Terra				
Analyst:	TL/PK	Date:	1/31/2022	Area type:	Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi)	0.340		
Last year of analysis:	2045				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
1	9	0.150	GP MP 1.22 - MP 1.37
2	7	0.190	GP MP 1.03 - MP 1.22
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 Segments

Number	Study Period Description	Number	Study Period Description
1	G1-1 Ramp from I-270 Y N	21	0
2	G2-2 Ramp from Democrac	22	0
3	G3-3 Ramp from Democrac	23	0
4	G4-4 Ramp from I-270 Y N	24	0
5	G4-5 Ramp from I-270 Y N	25	0
6	G6-6 Ramp from Democrac	26	0
7	G7-7 Ramp from Democrac	27	0
8	G7-8 Ramp from Democrac	28	0
9	G8-9 Ramp from I-270 Y S	29	0
10	0	30	0
11	G8-10 Ramp from I-270 Y S	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

Crossroad Ramp Terminals

Number	Config.	Control	Study Period Description
1	D3ex	Signal	Democracy Boulevard at I-270Y NB
2	D4	Signal	Democracy Boulevard at I-270Y SB
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0

Output Summary

General Information					
Project description:	I-270 I-495 Managed Lanes Study_2045 No Build_I-270 Y from Democracy Blvd to Westlake Terra				
Analyst:	TL/PK	Date:	1/31/2022	Area type:	Urban
First year of analysis:	2027				
Last year of analysis:	2045				

Crash Data Description				
Freeway segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp terminals	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	

Estimated Crash Statistics							
Crashes for Entire Facility		**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:		757.3	2.0	9.1	57.7	223.7	464.9
Estimated average crash freq. during Study Period, crashes/yr:		39.9	0.1	0.5	3.0	11.8	24.5
Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	2	296.2	1.3	3.0	21.5	65.1	205.3
Ramp segments, crashes:	10	49.3	0.5	1.6	7.8	12.1	27.3
Crossroad ramp terminals, crashes:	2	411.9	0.2	4.5	28.4	146.4	232.4
Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	39.9	0.1	0.5	3.0	11.8	24.5
	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
	2042	39.9	0.1	0.5	3.0	11.8	24.5
	2043	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 Crashes for Entire Facility

Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**C**	**PDO**
Multiple vehicle	Head-on crashes:	4.5	0.0	0.1	0.4	2.0	2.0
	Right-angle crashes:	102.7	0.1	1.2	7.9	39.5	54.1
	Rear-end crashes:	400.5	0.8	4.5	30.1	128.0	237.0
	Sideswipe crashes:	99.9	0.2	0.6	4.1	14.9	80.1
	Other multiple-vehicle crashes:	12.8	0.0	0.1	0.9	2.9	8.8
	Total multiple-vehicle crashes:	620.4	1.2	6.6	43.4	187.3	382.0
Single vehicle	Crashes with animal:	1.2	0.0	0.0	0.0	0.1	1.1
	Crashes with fixed object:	101.0	0.6	1.8	10.1	25.3	63.3
	Crashes with other object:	9.8	0.0	0.1	0.5	1.3	8.0
	Crashes with parked vehicle:	2.3	0.0	0.0	0.2	0.5	1.5
	Other single-vehicle crashes	22.7	0.2	0.6	3.5	9.2	9.2
	Total single-vehicle crashes:	136.9	0.8	2.5	14.2	36.4	83.0
Total crashes:		757.3	2.0	9.1	57.7	223.7	464.9

Evaluation Site Summary

General Information

Project description:	Phase 1 South I-270Y from I-495 to Democracy Boulevard				
Analyst:	PK	Date:	1/31/2022	Area type:	Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi)		1.030	
Last year of analysis:	2045				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
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 Segments

Number	Study Period Description	Number	Study Period Description
1	0	21	0
2	0	22	0
3	0	23	0
4	0	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

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
6	0	0	0

Output Summary							
General Information							
Project description:	Phase 1 South I-270Y from I-495 to Democracy Boulevard						
Analyst:	PK	Date:	1/31/2022	Area type:	Urban		
First year of analysis:	2027						
Last year of analysis:	2045						
Crash Data Description							
Freeway segments	Segment crash data available?		No	First year of crash data:			
	Project-level crash data available?		No	Last year of crash data:			
Ramp segments	Segment crash data available?		No	First year of crash data:			
	Project-level crash data available?		No	Last year of crash data:			
Ramp terminals	Segment crash data available?		No	First year of crash data:			
	Project-level crash data available?		No	Last year of crash data:			
Estimated Crash Statistics							
Crashes for Entire Facility		**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:		855.6	2.5	7.1	50.5	197.4	598.0
Estimated average crash freq. during Study Period, crashes/yr:		45.0	0.1	0.4	2.7	10.4	31.5
Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	6	855.6	2.5	7.1	50.5	197.4	598.0
Ramp segments, crashes:	0	0.0	0.0	0.0	0.0	0.0	0.0
Crossroad ramp terminals, crashes:	0	0.0	0.0	0.0	0.0	0.0	0.0
Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	45.0	0.1	0.4	2.7	10.4	31.5
	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
	2046						
	2047						
	2048						
	2049						
	2050						
Distribution of Crashes for Entire Facility							
Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**C**	**PDO**
Multiple vehicle	Head-on crashes:	2.4	0.0	0.0	0.3	1.1	0.9
	Right-angle crashes:	14.0	0.1	0.2	1.1	4.2	8.5
	Rear-end crashes:	468.3	1.4	3.9	27.9	109.0	326.2
	Sideswipe crashes:	159.6	0.3	1.0	6.8	26.6	124.9
	Other multiple-vehicle crashes:	16.5	0.1	0.2	1.1	4.3	10.9
	Total multiple-vehicle crashes:	660.8	1.9	5.2	37.1	145.2	471.5
Single vehicle	Crashes with animal:	2.9	0.0	0.0	0.0	0.2	2.7
	Crashes with fixed object:	140.2	0.5	1.3	9.6	37.6	91.1
	Crashes with other object:	21.6	0.0	0.1	0.7	2.8	17.9
	Crashes with parked vehicle:	2.8	0.0	0.0	0.2	0.7	1.8
	Other single-vehicle crashes	27.4	0.1	0.4	2.8	11.0	13.0
	Total single-vehicle crashes:	194.8	0.7	1.9	13.4	52.3	126.6
Total crashes:		855.6	2.5	7.1	50.5	197.4	598.0

Evaluation Site Summary

General Information

Project description:	Southern Study Limit to George Washington Memorial Parkway Interchange						
Analyst:	PK		Date:	1/31/2022	Area type:	Urban	
First year of analysis:	2027	Total length of freeway segments for Study Period (mi)			1.350		
Last year of analysis:	2045						

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
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	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 Segments

Number	Study Period Description	Number	Study Period Description
1	SB CD-1 I-495 SB	21	0
2	SB CD-2 I-495 SB	22	0
3	Ramp from VA 193 WB to I	23	0
4	Ramp from VA 193 WB to I	24	0
5	Ramp from VA 193 WB to I	25	0
6	Ramp from I-495 SB C-D R	26	0
7	Ramp from I-495 SB to VA	27	0
8	Ramp from I-495 NB to VA	28	0
9	Ramp from I-495 SB GP to	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

Crossroad Ramp Terminals

Number	Config.	Control	Study Period Description
1	D4	Signal	VA 193 at I-495 NB
2	D4	Signal	VA 193 at I-495 SB
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0

Output Summary

General Information					
Project description:	Southern Study Limit to George Washington Memorial Parkway Interchange				
Analyst:	PK	Date:	1/31/2022	Area type:	Urban
First year of analysis:	2027				
Last year of analysis:	2045				

Crash Data Description				
Freeway segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp terminals	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	

Estimated Crash Statistics							
Crashes for Entire Facility		**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:		2070.9	7.2	22.6	126.4	456.2	1458.4
Estimated average crash freq. during Study Period, crashes/yr:		109.0	0.4	1.2	6.7	24.0	76.8
Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	11	1597.2	6.5	17.9	98.8	336.9	1137.0
Ramp segments, crashes:	9	107.5	0.7	2.1	10.4	24.6	69.8
Crossroad ramp terminals, crashes:	2	366.3	0.1	2.6	17.2	94.7	251.6
Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	109.0	0.4	1.2	6.7	24.0	76.8
	2028	109.0	0.4	1.2	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	1.2	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	1.2	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
	2046						
	2047						
	2048						
	2049						
	2050						

Distribution of Crashes for Entire Facility

Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**C**	**PDO**
Multiple vehicle	Head-on crashes:	7.9	0.0	0.1	0.8	3.0	3.8
	Right-angle crashes:	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-vehicle crashes:	42.4	0.2	0.5	2.9	9.5	29.3
	Total multiple-vehicle crashes:	1667.6	5.3	17.0	96.4	358.3	1190.6
Single vehicle	Crashes with animal:	4.8	0.0	0.0	0.1	0.2	4.5
	Crashes with fixed object:	294.0	1.4	4.0	21.4	69.3	198.0
	Crashes with other object:	41.3	0.1	0.3	1.5	5.0	34.6
	Crashes with parked vehicle:	5.4	0.0	0.1	0.4	1.2	3.7
	Other single-vehicle crashes	57.7	0.4	1.3	6.8	22.2	27.0
	Total single-vehicle crashes:	403.3	1.9	5.6	30.1	97.9	267.8
Total crashes:		2070.9	7.2	22.6	126.4	456.2	1458.4

Evaluation Site Summary

General Information

Project description:	GWMP Interchange to Maryland Stateline				
Analyst:	PK	Date:	1/31/2022	Area type:	Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi)		0.330	
Last year of analysis:	2045				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
1	8	0.090	Ramp from I-495 NB ML to GWMP EB
2	10	0.070	GP MP 15.15 - MP 15.22
3	8	0.170	GP MP 15.22 - MP 15.39
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 Segments

Number	Study Period Description	Number	Study Period Description
1	Ramp from I-495 SB to GW	21	0
2	Ramp from I-495 NB ML ar	22	0
3	Ramp from I-495 NB to GW	23	0
4	Ramp from GWMP WB to I	24	0
5	Ramp from GWMP WB to I	25	0
6	Ramp from GWMP WB to I	26	0
7	Ramp from I-495 NB ML to	27	0
8	Ramp from GWMP WB to I	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

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
6	0	0	0

Output Summary

General Information

Project description:	GWMP Interchange to Maryland Stateline				
Analyst:	PK	Date:	1/31/2022	Area type:	Urban
First year of analysis:	2027				
Last year of analysis:	2045				

Crash Data Description

Freeway segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp terminals	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	

Estimated Crash Statistics

Crashes for Entire Facility	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:	921.0	3.7	10.7	62.1	189.6	654.8
Estimated average crash freq. during Study Period, crashes/yr:	48.5	0.2	0.6	3.3	10.0	34.5

Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	3	728.7	2.4	6.6	37.2	143.9	538.6
Ramp segments, crashes:	8	192.4	1.4	4.1	25.0	45.8	116.2
Crossroad ramp terminals, crashes:	0	0.0	0.0	0.0	0.0	0.0	0.0

Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	48.5	0.2	0.6	3.3	10.0	34.5
	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 Crashes for Entire Facility

Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**C**	**PDO**
Multiple vehicle	Head-on crashes:	3.8	0.0	0.1	0.5	1.5	1.7
	Right-angle crashes:	14.4	0.1	0.2	1.1	4.1	8.9
	Rear-end crashes:	529.8	2.2	6.2	35.7	114.2	371.5
	Sideswipe crashes:	189.9	0.5	1.4	7.9	26.1	154.0
	Other multiple-vehicle crashes:	32.4	0.2	0.6	3.3	8.2	20.1
	Total multiple-vehicle crashes:	770.3	2.9	8.5	48.6	154.1	556.2
Single vehicle	Crashes with animal:	1.9	0.0	0.0	0.0	0.1	1.7
	Crashes with fixed object:	111.5	0.6	1.6	9.7	25.6	73.9
	Crashes with other object:	12.2	0.0	0.1	0.4	1.3	10.4
	Crashes with parked vehicle:	2.2	0.0	0.0	0.2	0.5	1.5
	Other single-vehicle crashes	23.0	0.2	0.5	3.2	8.0	11.1
	Total single-vehicle crashes:	150.7	0.8	2.3	13.5	35.6	98.6
Total crashes:		921.0	3.7	10.7	62.1	189.6	654.8

Evaluation Site Summary

General Information

Project description:	I-270 I-495 Managed Lanes Study_2045 No Build_ I-495 from Virginia Stateline to MD 190				
Analyst:	PK	Date:	1/31/2022	Area type:	Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi)		2.370	
Last year of analysis:	2045				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
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	0.070	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 Segments

Number	Study Period Description	Number	Study Period Description
1	G1-1 I-495 NB to CBP WB	21	0
2	G3-1 CBP EB to I-495 NB	22	0
3	G4-1 I-495 NB to CBP EB	23	0
4	G4-2 I-495 NB to CBP EB	24	0
5	G6-1 CBP EB to I-495 SB	25	0
6	G7-1 CBP WB to I-495 SB	26	0
7	G7-2 CBP Wb to I-495 SB	27	0
8	G8-1 I-495 SB to CBP WB	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

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
6	0	0	0

Output Summary

General Information					
Project description:	I-270 I-495 Managed Lanes Study_2045 No Build_ I-495 from Virginia Stateline to MD 190				
Analyst:	PK	Date:	1/31/2022	Area type:	Urban
First year of analysis:	2027				
Last year of analysis:	2045				

Crash Data Description				
Freeway segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp terminals	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	

Estimated Crash Statistics							
Crashes for Entire Facility		**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:		4730.2	12.8	35.7	248.6	1025.4	3407.7
Estimated average crash freq. during Study Period, crashes/yr:		249.0	0.7	1.9	13.1	54.0	179.4
Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	11	4658.2	12.0	33.4	236.2	1007.5	3369.0
Ramp segments, crashes:	8	72.1	0.8	2.3	12.3	17.9	38.7
Crossroad ramp terminals, crashes:	0	0.0	0.0	0.0	0.0	0.0	0.0
Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	249.0	0.7	1.9	13.1	54.0	179.4
	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	179.4
	2044	249.0	0.7	1.9	13.1	54.0	179.4
	2045	249.0	0.7	1.9	13.1	54.0	179.4
	2046						
	2047						
	2048						
	2049						
	2050						

Distribution of Crashes for Entire Facility

Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**C**	**PDO**
Multiple vehicle	Head-on crashes:	14.1	0.1	0.2	1.5	6.4	6.0
	Right-angle crashes:	82.3	0.3	0.8	5.6	24.0	51.6
	Rear-end crashes:	2766.4	7.3	20.2	142.2	598.1	1998.7
	Sideswipe crashes:	947.2	1.7	4.9	34.3	144.6	761.7
	Other multiple-vehicle crashes:	102.6	0.3	0.9	6.2	25.0	70.2
	Total multiple-vehicle crashes:	3912.8	9.7	27.0	189.9	798.0	2888.2
Single vehicle	Crashes with animal:	12.2	0.0	0.0	0.2	0.8	11.2
	Crashes with fixed object:	592.1	2.2	6.3	42.4	164.3	376.9
	Crashes with other object:	83.6	0.1	0.4	2.7	11.4	68.9
	Crashes with parked vehicle:	11.7	0.0	0.1	0.8	3.2	7.6
	Other single-vehicle crashes	117.8	0.7	1.9	12.5	47.7	55.0
	Total single-vehicle crashes:	817.5	3.1	8.8	58.7	227.4	519.5
Total crashes:		4730.2	12.8	35.7	248.6	1025.4	3407.7

Evaluation Site Summary

General Information

Project description:	I-270 I-495 Managed Lanes Study_2045 No Build_ I-495 Between MD 190 and I-270Y				
Analyst:	PK	Date:	1/31/2022	Area type:	Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi)		1.290	
Last year of analysis:	2045				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
1	10	0.200	GP MP 2.37 - MP 2.57
2	10	0.030	GP MP 2.57 - MP 2.60
3	10	0.650	GP MP 2.60 - MP 3.25
4	10	0.410	GP MP 3.25 - 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 Segments

Number	Study Period Description	Number	Study Period Description
1	GA-1 Ramp from CBP to I-	21	0
2	GB-1 Ramp from CBP to M	22	0
3	G1-1 Ramp from I-495 NB	23	0
4	G4-1 Ramp from I-495 NB	24	0
5	G4-2 Ramp from I-495 NB	25	0
6	G4-3 Ramp from I-495 NB	26	0
7	G2-1 Ramp from MD 190 W	27	0
8	G5-1 Ramp from Ramp 11	28	0
9	0	29	0
10	G7-1 Ramp 7 to Ramp 11	30	0
11	G10-1 Ramp from I-495 SB	31	0
12	SB CD-5 from MD 190 to I-	32	0
13	SB CD-6 from MD 190 to I-	33	0
14	SB CD-1 from I-495 SB to C	34	0
15	SB CD-2 from I-495 SB MD	35	0
16	SB CD-3 Ramp from I-495	36	0
17	SB CD-4 from I-495 SB MD	37	0
18	G2-2 Ramp from MD 190 W	38	0
19	G6-1 Ramp from MD 190 E	39	0
20	0	40	0

Crossroad Ramp Terminals

Number	Config.	Control	Study Period Description
1	D3en	Signal	MD 190 at I-495 NB
2	D3ex	Signal	MD 190 at I-495 SB
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0

Output Summary

General Information					
Project description:	I-270 I-495 Managed Lanes Study_2045 No Build_ I-495 Between MD 190 and I-270Y				
Analyst:	PK	Date:	1/31/2022	Area type:	Urban
First year of analysis:	2027				
Last year of analysis:	2045				

Crash Data Description				
Freeway segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp terminals	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	

Estimated Crash Statistics							
Crashes for Entire Facility		**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:		2554.3	7.5	22.7	151.4	575.8	1796.9
Estimated average crash freq. during Study Period, crashes/yr:		134.4	0.4	1.2	8.0	30.3	94.6
Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	4	2244.4	5.9	16.4	116.8	493.0	1612.3
Ramp segments, crashes:	18	179.0	1.6	4.7	25.4	41.3	106.0
Crossroad ramp terminals, crashes:	2	130.9	0.1	1.5	9.2	41.5	78.6
Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	134.4	0.4	1.2	8.0	30.3	94.6
	2028	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
	2031	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
	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	8.0	30.3	94.6
	2046						
	2047						
	2048						
	2049						
	2050						

Distribution of Crashes for Entire Facility

Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		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-vehicle crashes:	2011.1	5.0	15.3	105.6	427.3	1457.9
Single vehicle	Crashes with animal:	7.0	0.0	0.0	0.1	0.5	6.3
	Crashes with fixed object:	397.6	1.8	5.3	32.9	106.6	250.9
	Crashes with other object:	50.0	0.1	0.3	1.8	6.9	40.9
	Crashes with parked vehicle:	7.5	0.0	0.1	0.6	2.0	4.7
	Other single-vehicle crashes	81.2	0.6	1.7	10.4	32.5	36.1
	Total single-vehicle crashes:	543.2	2.5	7.4	45.8	148.5	339.0
Total crashes:		2554.3	7.5	22.7	151.4	575.8	1796.9

Evaluation Site Summary

General Information

Project description:	I-270 I-495 Managed Lanes Study_2045 No Build_I-495 Between I-270Y to MD 187				
Analyst:	PK	Date:	1/31/2022	Area type:	Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi)		1.950	
Last year of analysis:	2045				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
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
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 Segments

Number	Study Period Description	Number	Study Period Description
1	G2-1 Ramp from I-495 WB	21	0
2	0	22	0
3	0	23	0
4	G4-2 Ramp from MD 187 N	24	0
5	G6-1 Ramp from I-495 EB	25	0
6	0	26	0
7	0	27	0
8	G8-2 Ramp from MD 187 to	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

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
6	0	0	0

Output Summary						
General Information						
Project description:	I-270 I-495 Managed Lanes Study_2045 No Build_I-495 Between I-270Y to MD 187					
Analyst:	PK	Date:	1/31/2022	Area type:	Urban	
First year of analysis:	2027					
Last year of analysis:	2045					
Crash Data Description						
Freeway segments	Segment crash data available?	No	First year of crash data:			
	Project-level crash data available?	No	Last year of crash data:			
Ramp segments	Segment crash data available?	No	First year of crash data:			
	Project-level crash data available?	No	Last year of crash data:			
Ramp terminals	Segment crash data available?	No	First year of crash data:			
	Project-level crash data available?	No	Last year of crash data:			

Estimated Crash Statistics							
Crashes for Entire Facility		**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:		1248.1	4.5	12.2	84.5	282.5	864.4
Estimated average crash freq. during Study Period, crashes/yr:		65.7	0.2	0.6	4.4	14.9	45.5
Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	5	1223.6	4.2	11.3	80.1	276.4	851.5
Ramp segments, crashes:	4	24.5	0.3	0.9	4.4	6.1	12.9
Crossroad ramp terminals, crashes:	0	0.0	0.0	0.0	0.0	0.0	0.0
Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	65.7	0.2	0.6	4.4	14.9	45.5
	2028	65.7	0.2	0.6	4.4	14.9	45.5
	2029	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
	2033	65.7	0.2	0.6	4.4	14.9	45.5
	2034	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
	2046						
	2047						
	2048						
	2049						
	2050						

Distribution of Crashes for Entire Facility							
Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**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 crashes:	23.7	0.1	0.3	1.8	6.1	15.4
	Total multiple-vehicle crashes:	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
	Crashes with fixed object:	245.6	1.0	2.9	19.3	61.1	161.3
	Crashes with other object:	35.6	0.1	0.2	1.3	4.2	29.9
	Crashes with parked vehicle:	5.1	0.0	0.1	0.4	1.2	3.4
	Other single-vehicle crashes	48.7	0.3	0.9	5.8	17.9	23.8
	Total single-vehicle crashes:	340.1	1.4	4.0	26.8	84.8	223.1
Total crashes:		1248.1	4.5	12.2	84.5	282.5	864.4

Evaluation Site Summary

General Information

Project description:	I-270 I-495 Managed Lane Study_2045 No Build_I-495 MD 187 to I-270 MD 355						
Analyst:	PK		Date:	1/31/2022	Area type:		Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi)			1.460		
Last year of analysis:	2045						

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
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	0.210	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 Segments

Number	Study Period Description	Number	Study Period Description
1	G1 Ramp from MD 355 NB	21	0
2	G1 Ramp from MD 355 NB	22	0
3	G2 Ramp from I-495 WB to	23	0
4	G4 Ramp from MD 355 NB	24	0
5	G5 Ramp from MD 355 SB	25	0
6	G6-1 Ramp from I-495 EB	26	0
7	G6-2 Ramp from I-495 EB	27	0
8	G6 Ramp from I-270 EB to	28	0
9	I-495 WB to I-270 NB Conn	29	0
10	I-495 WB to I-270 NB Conn	30	0
11	I-270 SB to I-495 EB Conn	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

Crossroad Ramp Terminals

Number	Config.	Control	Study Period Description
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

Output Summary							
General Information							
Project description:	I-270 I-495 Managed Lane Study_2045 No Build_I-495 MD 187 to I-270 MD 355						
Analyst:	PK	Date:	1/31/2022	Area type:	Urban		
First year of analysis:	2027						
Last year of analysis:	2045						
Crash Data Description							
Freeway segments	Segment crash data available?		No	First year of crash data:			
	Project-level crash data available?		No	Last year of crash data:			
Ramp segments	Segment crash data available?		No	First year of crash data:			
	Project-level crash data available?		No	Last year of crash data:			
Ramp terminals	Segment crash data available?		No	First year of crash data:			
	Project-level crash data available?		No	Last year of crash data:			
Estimated Crash Statistics							
Crashes for Entire Facility		**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:		2504.4	8.2	35.4	217.4	791.0	1452.4
Estimated average crash freq. during Study Period, crashes/yr:		131.8	0.4	1.9	11.4	41.6	76.4
Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	10	1507.5	4.5	12.4	88.1	333.5	1069.0
Ramp segments, crashes:	11	297.3	3.2	9.7	50.2	99.1	135.1
Crossroad ramp terminals, crashes:	2	699.6	0.5	13.3	79.1	358.4	248.3
Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	131.8	0.4	1.9	11.4	41.6	76.4
	2028	131.8	0.4	1.9	11.4	41.6	76.4
	2029	131.8	0.4	1.9	11.4	41.6	76.4
	2030	131.8	0.4	1.9	11.4	41.6	76.4
	2031	131.8	0.4	1.9	11.4	41.6	76.4
	2032	131.8	0.4	1.9	11.4	41.6	76.4
	2033	131.8	0.4	1.9	11.4	41.6	76.4
	2034	131.8	0.4	1.9	11.4	41.6	76.4
	2035	131.8	0.4	1.9	11.4	41.6	76.4
	2036	131.8	0.4	1.9	11.4	41.6	76.4
	2037	131.8	0.4	1.9	11.4	41.6	76.4
	2038	131.8	0.4	1.9	11.4	41.6	76.4
	2039	131.8	0.4	1.9	11.4	41.6	76.4
	2040	131.8	0.4	1.9	11.4	41.6	76.4
	2041	131.8	0.4	1.9	11.4	41.6	76.4
	2042	131.8	0.4	1.9	11.4	41.6	76.4
	2043	131.8	0.4	1.9	11.4	41.6	76.4
	2044	131.8	0.4	1.9	11.4	41.6	76.4
	2045	131.8	0.4	1.9	11.4	41.6	76.4
	2046						
	2047						
	2048						
	2049						
	2050						

Distribution of Crashes for Entire Facility

Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**C**	**PDO**
Multiple vehicle	Head-on crashes:	13.3	0.1	0.3	1.9	6.9	4.1
	Right-angle crashes:	198.6	0.3	3.8	22.8	101.1	70.7
	Rear-end crashes:	1383.1	4.4	20.0	123.8	464.5	770.5
	Sideswipe crashes:	392.7	0.9	3.1	20.0	70.6	298.1
	Other multiple-vehicle crashes:	63.4	0.4	1.3	7.6	21.0	33.1
	Total multiple-vehicle crashes:	2051.1	6.1	28.5	176.0	664.0	1176.5
Single vehicle	Crashes with animal:	4.9	0.0	0.0	0.1	0.3	4.5
	Crashes with fixed object:	329.8	1.6	4.9	29.3	89.1	205.0
	Crashes with other object:	40.6	0.1	0.2	1.6	5.5	33.2
	Crashes with parked vehicle:	6.6	0.0	0.1	0.6	1.8	4.1
	Other single-vehicle crashes	71.5	0.5	1.7	9.9	30.3	29.1
	Total single-vehicle crashes:	453.3	2.2	6.9	41.4	127.0	275.9
Total crashes:		2504.4	8.2	35.4	217.4	791.0	1452.4

Evaluation Site Summary

General Information

Project description:	ISATe_GWMP				
Analyst:	AS	Date:	1/31/2022	Area type:	Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi)	0.240		
Last year of analysis:	2045				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
1	4	0.240	GWMP
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	0	0.000	0

Ramp Segments

Number	Study Period Description	Number	Study Period Description
1	0	21	0
2	0	22	0
3	0	23	0
4	0	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

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
6	0	0	0

Output Summary						
General Information						
Project description:	ISATe_GWMP					
Analyst:	AS	Date:	1/31/2022	Area type:	Urban	
First year of analysis:	2027					
Last year of analysis:	2045					

Crash Data Description				
Freeway segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp terminals	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	

Estimated Crash Statistics							
Crashes for Entire Facility		**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:		50.7	0.4	0.8	6.0	10.6	32.8
Estimated average crash freq. during Study Period, crashes/yr:		2.7	0.0	0.0	0.3	0.6	1.7
Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	1	50.7	0.4	0.8	6.0	10.6	32.8
Ramp segments, crashes:	0	0.0	0.0	0.0	0.0	0.0	0.0
Crossroad ramp terminals, crashes:	0	0.0	0.0	0.0	0.0	0.0	0.0
Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	2.7	0.0	0.0	0.3	0.6	1.7
	2028	2.7	0.0	0.0	0.3	0.6	1.7
	2029	2.7	0.0	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
	2041	2.7	0.0	0.0	0.3	0.6	1.7
	2042	2.7	0.0	0.0	0.3	0.6	1.7
	2043	2.7	0.0	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 Crashes for Entire Facility							
Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**C**	**PDO**
Multiple vehicle	Head-on crashes:	0.1	0.0	0.0	0.0	0.0	0.0
	Right-angle crashes:	0.6	0.0	0.0	0.1	0.2	0.4
	Rear-end crashes:	20.3	0.2	0.3	2.5	4.3	13.0
	Sideswipe crashes:	7.5	0.0	0.1	0.6	1.1	5.7
	Other multiple-vehicle crashes:	0.7	0.0	0.0	0.1	0.2	0.4
	Total multiple-vehicle crashes:	29.2	0.2	0.4	3.3	5.7	19.5
Single vehicle	Crashes with animal:	0.3	0.0	0.0	0.0	0.0	0.3
	Crashes with fixed object:	15.4	0.1	0.3	2.0	3.5	9.5
	Crashes with other object:	2.5	0.0	0.0	0.2	0.3	2.0
	Crashes with parked vehicle:	0.3	0.0	0.0	0.0	0.1	0.2
	Other single-vehicle crashes	3.1	0.0	0.1	0.6	1.0	1.4
	Total single-vehicle crashes:	21.6	0.2	0.4	2.8	4.9	13.4
Total crashes:		50.7	0.4	0.8	6.0	10.6	32.8

Evaluation Site Summary

General Information

Project description:	I-370 From Fields Road to I-270 Ramps_Phase 1 Build				
Analyst:	DK	Date:	1/31/2022	Area type:	Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi)		1.200	
Last year of analysis:	2045				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
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
9	6	0.010	GP MP 1.18 - MP 1.19
10	7	0.260	GP MP 1.19 - MP 1.45
11	0	0.000	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 Segments

Number	Study Period Description	Number	Study Period Description
1	Ramp from I-370 WB to Wa	21	0
2	Ramp from Washingtonian	22	0
3	Ramp from Fields Rd/Sam	23	0
4	Ramp from Washingtonian	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

Crossroad Ramp Terminals

Number	Config.	Control	Study Period Description
1	D4	Signal	Washingtonian Blvd at I-370 EB
2	D4	Signal	Washingtonian Blvd at I-370 WB
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0

Output Summary						
General Information						
Project description:	I-370 From Fields Road to I-270 Ramps_Phase 1 Build					
Analyst:	DK	Date:	1/31/2022	Area type:	Urban	
First year of analysis:	2027					
Last year of analysis:	2045					
Crash Data Description						
Freeway segments	Segment crash data available?		No	First year of crash data:		
	Project-level crash data available?		No	Last year of crash data:		
Ramp segments	Segment crash data available?		No	First year of crash data:		
	Project-level crash data available?		No	Last year of crash data:		
Ramp terminals	Segment crash data available?		No	First year of crash data:		
	Project-level crash data available?		No	Last year of crash data:		

Estimated Crash Statistics							
Crashes for Entire Facility		**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:		343.3	1.8	5.3	35.1	81.7	219.4
Estimated average crash freq. during Study Period, crashes/yr:		18.1	0.1	0.3	1.8	4.3	11.5
Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	10	261.9	1.6	4.2	28.8	60.5	166.8
Ramp segments, crashes:	4	11.4	0.2	0.5	2.2	2.8	5.8
Crossroad ramp terminals, crashes:	2	70.0	0.0	0.7	4.1	18.3	46.8
Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	18.1	0.1	0.3	1.8	4.3	11.5
	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 Crashes for Entire Facility

Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**C**	**PDO**
Multiple vehicle	Head-on crashes:	1.2	0.0	0.0	0.2	0.4	0.5
	Right-angle crashes:	19.6	0.0	0.2	1.5	5.7	12.1
	Rear-end crashes:	150.0	0.7	2.1	14.3	37.7	95.2
	Sideswipe crashes:	44.9	0.2	0.5	3.1	7.3	33.9
	Other multiple-vehicle crashes:	4.9	0.0	0.1	0.5	1.1	3.2
	Total multiple-vehicle crashes:	220.5	0.9	2.9	19.5	52.2	144.9
Single vehicle	Crashes with animal:	1.6	0.0	0.0	0.0	0.1	1.4
	Crashes with fixed object:	89.0	0.7	1.7	11.1	21.0	54.4
	Crashes with other object:	12.1	0.0	0.1	0.8	1.5	9.7
	Crashes with parked vehicle:	1.8	0.0	0.0	0.2	0.4	1.1
	Other single-vehicle crashes	18.3	0.2	0.5	3.4	6.5	7.8
	Total single-vehicle crashes:	122.7	0.9	2.4	15.5	29.5	74.4
Total crashes:		343.3	1.8	5.3	35.1	81.7	219.4

Enhanced Interchange Safety Analysis Tool

Output Summary & Evaluation Site Summary Reports

for the

Preferred Alternative

Evaluation Site Summary

General Information

Project description:	I-270 From MD 117 to I-370_Phase 1 Build				
Analyst:	DK	Date:	1/31/22	Area type:	Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi):		1.570	
Last year of analysis:	2045				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
1	8	0.250	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
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 Segments

Number	Study Period Description	Number	Study Period Description
1	C1-1 Ramp from I-270 NB to	21	0
2	C1-2 Ramp from I-270 NB to	22	0
3	G6-31 Ramp from MD 117 E	23	0
4	G6-32 Ramp from MD 117 t	24	0
5	G6-4 Ramp from 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
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

Crossroad Ramp Terminals

Number	Config.	Control	Study Period Description
1	D3ex	Signal	MD 117 at I-270 NB
2	D3en	One stop	MD 117 at I-270 SB
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0

Output Summary

General Information

Project description:	I-270 From MD 117 to I-370_Phase 1 Build				
Analyst:	DK	Date:	1/31/22	Area type:	Urban
First year of analysis:	2027				
Last year of analysis:	2045				

Crash Data Description

Freeway segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp terminals	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	

Estimated Crash Statistics

Crashes for Entire Facility	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:	2844.5	10.4	32.5	184.0	652.2	1965.4
Estimated average crash freq. during Study Period, crashes/yr:	149.7	0.5	1.7	9.7	34.3	103.4

Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	6	2145.2	8.1	22.6	127.7	450.6	1536.2
Ramp segments, crashes:	9	321.4	1.7	5.3	27.8	75.0	211.6
Crossroad ramp terminals, crashes:	2	377.9	0.6	4.6	28.5	126.6	217.6

Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	149.7	0.5	1.7	9.7	34.3	103.4
	2028	149.7	0.5	1.7	9.7	34.3	103.4
	2029	149.7	0.5	1.7	9.7	34.3	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
	2034	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						
	2050						

Distribution of Crashes for Entire Facility

Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**C**	**PDO**
Multiple vehicle	Head-on crashes:	13.3	0.1	0.3	1.5	5.4	6.1
	Right-angle crashes:	167.3	0.4	2.3	13.8	58.2	92.6
	Rear-end crashes:	1527.8	5.8	17.9	101.6	361.1	1041.5
	Sideswipe crashes:	509.7	1.3	3.8	21.3	74.3	409.0
	Other multiple-vehicle crashes:	76.9	0.4	1.1	6.1	19.8	49.6
	Total multiple-vehicle crashes:	2295.0	8.0	25.3	144.3	518.7	1598.8
Single vehicle	Crashes with animal:	7.1	0.0	0.0	0.1	0.4	6.6
	Crashes with fixed object:	402.2	1.8	5.2	28.6	96.1	270.6
	Crashes with other object:	50.5	0.1	0.3	1.7	5.7	42.7
	Crashes with parked vehicle:	8.8	0.0	0.1	0.5	1.8	6.4
	Other single-vehicle crashes	80.8	0.5	1.6	8.8	29.4	40.4
	Total single-vehicle crashes:	549.5	2.4	7.2	39.7	133.5	366.7
	Total crashes:	2844.5	10.4	32.5	184.0	652.2	1965.4

Evaluation Site Summary

General Information

Project description:	I-270 From I-370 to Shady Grove Rd_Phase 1 Build				
Analyst:	DK	Date:	1/31/22	Area type:	Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi):		0.930	
Last year of analysis:	2045				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
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
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 Segments

Number	Study Period Description	Number	Study Period Description
1	G1-2 Ramp from I-270 NB t	21	M11-1 Ramp from I-370 WB
2	G1-3 Ramp from I-270 to I-3	22	M11-2 Ramp from I-370 to I-
3	G1-4 Ramp from I-270 to I-3	23	M12-5 Ramp from I-270 NB
4	G2-5 Ramp from I-370 WB t	24	M9-6 Ramp from I-270 NB M
5	G2-6 Ramp from I-370 WB t	25	M12-7 Ramp from I-270 NB
6	G2-7 Ramp from I-370 WB t	26	M12-8 Ramp from I-270 NB
7	G3-80 Ramp from I-370 EB	27	M0-1 Ramp from I-270 NB M
8	G3-81 Ramp from I-370 EB	28	M0-2 Ramp from I-270 SB C
9	G3-82 Ramp from I-370 EB	29	0
10	G4-9 Ramp from 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	G6-13 Ramp from I-370 EB	34	0
15	G7-14 Ramp from I-370 WB	35	0
16	G7-14-2 Ramp from I-370 W	36	0
17	G7-15 Ramp from I-370 to I-	37	0
18	G8-16 Ramp from I-270 SB	38	0
19	M10-1 Ramp from I-370 EB	39	0
20	M10-2 Ramp from I-370 EB	40	0

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
6	0	0	0

Output Summary

General Information

Project description:	I-270 From I-370 to Shady Grove Rd_Phase 1 Build				
Analyst:	DK	Date:	1/31/22	Area type:	Urban
First year of analysis:	2027				
Last year of analysis:	2045				

Crash Data Description

Freeway segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp terminals	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	

Estimated Crash Statistics

Crashes for Entire Facility	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:	1541.3	8.3	23.7	130.7	330.9	1047.8
Estimated average crash freq. during Study Period, crashes/yr:	81.1	0.4	1.2	6.9	17.4	55.1

Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	8	977.7	4.6	12.6	69.3	200.8	690.4
Ramp segments, crashes:	28	563.7	3.7	11.1	61.4	130.1	357.4
Crossroad ramp terminals, crashes:	0	0.0	0.0	0.0	0.0	0.0	0.0

Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	81.1	0.4	1.2	6.9	17.4	55.1
	2028	81.1	0.4	1.2	6.9	17.4	55.1
	2029	81.1	0.4	1.2	6.9	17.4	55.1
	2030	81.1	0.4	1.2	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	1.2	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	1.2	6.9	17.4	55.1
	2041	81.1	0.4	1.2	6.9	17.4	55.1
	2042	81.1	0.4	1.2	6.9	17.4	55.1
	2043	81.1	0.4	1.2	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 Crashes for Entire Facility

Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**C**	**PDO**
Multiple vehicle	Head-on crashes:	7.0	0.1	0.2	1.0	2.4	3.4
	Right-angle crashes:	18.4	0.1	0.3	1.8	5.0	11.1
	Rear-end crashes:	775.8	4.3	12.1	67.0	176.9	515.6
	Sideswipe crashes:	289.7	1.0	2.7	14.8	39.8	231.4
	Other multiple-vehicle crashes:	63.6	0.4	1.2	6.9	16.6	38.5
	Total multiple-vehicle crashes:	1154.6	5.8	16.5	91.5	240.7	800.0
Single vehicle	Crashes with animal:	3.9	0.0	0.0	0.1	0.2	3.6
	Crashes with fixed object:	288.8	1.8	5.1	28.1	64.5	189.3
	Crashes with other object:	30.0	0.1	0.2	1.3	3.5	24.9
	Crashes with parked vehicle:	4.8	0.0	0.1	0.5	1.1	3.1
	Other single-vehicle crashes	59.3	0.6	1.7	9.2	20.9	26.9
	Total single-vehicle crashes:	386.8	2.5	7.1	39.2	90.2	247.8
	Total crashes:	1541.3	8.3	23.7	130.7	330.9	1047.8

Evaluation Site Summary

General Information

Project description:	I-270 From Shady Grove Rd to W.Gude Dr_Phase 1 Build				
Analyst:	DK	Date:	1/31/22	Area type:	Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi):		0.810	
Last year of analysis:	2045				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
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	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 Segments

Number	Study Period Description	Number	Study Period Description
1	G2-1 Ramp from Shady Gro	21	0
2	G3-2 Ramp from Shady Gro	22	0
3	G4-3 Ramp from I-270 NB t	23	0
4	G4-4 Ramp from I-270 NB t	24	0
5	G6-5 Ramp from Shady Gro	25	0
6	G7-6 Ramp from Shady Gro	26	0
7	G8-8 Ramp from Shady Gro	27	0
8	G8-7 Ramp from I-270 SB t	28	0
9	G9-9 Ramp from I-270 NB t	29	0
10	G10-10 Ramp from I-270 SE	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

Crossroad Ramp Terminals

Number	Config.	Control	Study Period Description
1	A4	Signal	Shady Grove Road at I-270 NB
2	A4	Signal	Shady Grove Road at I-270 SB
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0

Output Summary

General Information

Project description:	I-270 From Shady Grove Rd to W.Gude Dr_Phase 1 Build				
Analyst:	DK	Date:	1/31/22	Area type:	Urban
First year of analysis:	2027				
Last year of analysis:	2045				

Crash Data Description

Freeway segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp terminals	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	

Estimated Crash Statistics

Crashes for Entire Facility	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:	1177.4	4.1	16.2	89.4	312.9	754.8
Estimated average crash freq. during Study Period, crashes/yr:	62.0	0.2	0.9	4.7	16.5	39.7

Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	6	691.5	3.1	8.5	47.2	152.1	480.6
Ramp segments, crashes:	10	77.7	0.8	2.5	11.0	19.6	43.8
Crossroad ramp terminals, crashes:	2	408.3	0.2	5.2	31.2	141.3	230.3

Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	62.0	0.2	0.9	4.7	16.5	39.7
	2028	62.0	0.2	0.9	4.7	16.5	39.7
	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
	2046						
	2047						
	2048						
	2049						
	2050						

Distribution of Crashes for Entire Facility

Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**C**	**PDO**
Multiple vehicle	Head-on crashes:	5.6	0.0	0.1	0.6	2.4	2.4
	Right-angle crashes:	108.2	0.1	1.5	9.1	39.9	57.5
	Rear-end crashes:	615.4	1.8	8.0	45.9	172.0	387.7
	Sideswipe crashes:	173.9	0.4	1.4	7.7	26.3	138.1
	Other multiple-vehicle crashes:	20.6	0.1	0.3	1.5	4.8	14.1
	Total multiple-vehicle crashes:	923.7	2.5	11.3	64.8	245.3	599.8
Single vehicle	Crashes with animal:	2.6	0.0	0.0	0.1	0.2	2.4
	Crashes with fixed object:	186.6	1.1	3.5	17.5	47.8	116.7
	Crashes with other object:	20.6	0.1	0.2	0.9	2.7	16.7
	Crashes with parked vehicle:	3.8	0.0	0.1	0.3	0.9	2.4
	Other single-vehicle crashes	40.1	0.4	1.2	5.8	16.0	16.8
	Total single-vehicle crashes:	253.7	1.6	4.9	24.6	67.6	155.0
Total crashes:		1177.4	4.1	16.2	89.4	312.9	754.8

Evaluation Site Summary

General Information

Project description:	I-270 From W.Gude Dr to MD 28__Phase 1 Build				
Analyst:	DK	Date:	1/31/22	Area type:	Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi):		1.100	
Last year of analysis:	2045				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
1	10	0.830	GP MP 7.57 - MP 6.74
2	10	0.100	GP MP 6.74 - MP 6.64
3	10	0.070	GP MP 6.64 - MP 6.57
4	10	0.080	GP MP 6.57 - MP 6.49
5	10	0.020	GP MP 6.49 - MP 6.47
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 Segments

Number	Study Period Description	Number	Study Period Description
1	MT1-1 Ramp from I-270 SB	21	0
2	MT1-2 Ramp from I-270 SB	22	0
3	MT2-3 Ramp from Gude Dr	23	0
4	MT3-4 Ramp from Gude Dr	24	0
5	MT4-5 Ramp from I-270 NB	25	0
6	MT4-6 Ramp from I-270 NB	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

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
6	0	0	0

Output Summary

General Information

Project description:	I-270 From W.Gude Dr to MD 28__Phase 1 Build				
Analyst:	DK	Date:	1/31/22	Area type:	Urban
First year of analysis:	2027				
Last year of analysis:	2045				

Crash Data Description

Freeway segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp terminals	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	

Estimated Crash Statistics

Crashes for Entire Facility	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:	1266.7	5.5	15.4	85.0	271.5	889.3
Estimated average crash freq. during Study Period, crashes/yr:	66.7	0.3	0.8	4.5	14.3	46.8

Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	5	1221.7	5.1	14.2	79.1	260.7	862.6
Ramp segments, crashes:	6	44.9	0.4	1.2	5.9	10.8	26.7
Crossroad ramp terminals, crashes:	0	0.0	0.0	0.0	0.0	0.0	0.0

Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	66.7	0.3	0.8	4.5	14.3	46.8
	2028	66.7	0.3	0.8	4.5	14.3	46.8
	2029	66.7	0.3	0.8	4.5	14.3	46.8
	2030	66.7	0.3	0.8	4.5	14.3	46.8
	2031	66.7	0.3	0.8	4.5	14.3	46.8
	2032	66.7	0.3	0.8	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	0.8	4.5	14.3	46.8
	2038	66.7	0.3	0.8	4.5	14.3	46.8
	2039	66.7	0.3	0.8	4.5	14.3	46.8
	2040	66.7	0.3	0.8	4.5	14.3	46.8
	2041	66.7	0.3	0.8	4.5	14.3	46.8
	2042	66.7	0.3	0.8	4.5	14.3	46.8
	2043	66.7	0.3	0.8	4.5	14.3	46.8
	2044	66.7	0.3	0.8	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 Crashes for Entire Facility

Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**C**	**PDO**
Multiple vehicle	Head-on crashes:	3.5	0.0	0.1	0.5	1.5	1.4
	Right-angle crashes:	20.2	0.1	0.3	1.8	5.8	12.2
	Rear-end crashes:	672.9	2.9	8.1	45.0	147.2	469.8
	Sideswipe crashes:	229.7	0.7	2.0	10.9	35.7	180.4
	Other multiple-vehicle crashes:	24.8	0.1	0.3	1.9	6.0	16.4
	Total multiple-vehicle crashes:	951.2	3.9	10.8	60.0	196.3	680.2
Single vehicle	Crashes with animal:	4.5	0.0	0.0	0.1	0.3	4.2
	Crashes with fixed object:	229.4	1.2	3.3	18.0	54.2	152.7
	Crashes with other object:	31.8	0.1	0.2	1.1	3.6	26.8
	Crashes with parked vehicle:	4.5	0.0	0.1	0.3	1.0	3.0
	Other single-vehicle crashes	45.2	0.4	1.0	5.4	16.1	22.3
	Total single-vehicle crashes:	315.5	1.6	4.6	25.0	75.2	209.0
	Total crashes:	1266.7	5.5	15.4	85.0	271.5	889.3

Evaluation Site Summary

General Information

Project description:	I-270 From MD 28 to MD 189_Phase 1 Build				
Analyst:	DK	Date:	1/31/22	Area type:	Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi):		0.970	
Last year of analysis:	2045				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
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 Segments

Number	Study Period Description	Number	Study Period Description
1	C1-1 Ramp from I-270 NB to	21	0
2	C2-2 Ramp from MD 28 WB	22	0
3	C3-3 Ramp from MD 28 EB	23	0
4	C4-4 Ramp from I-270 NB to	24	0
5	C4-5 Ramp from I-270 NB to	25	0
6	G5-6 Ramp from I-270 SB to	26	0
7	G5-7 Ramp from I-270 SB to	27	0
8	G6-8 Ramp from MD 28 EB	28	0
9	G7-9 Ramp from MD 28 WB	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

Crossroad Ramp Terminals

Number	Config.	Control	Study Period Description
1	D3ex	Signal	MD 28 at I-270 NB
2	D3ex	Signal	MD 28 at I-270 SB
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0

Output Summary

General Information					
Project description:	I-270 From MD 28 to MD 189_Phase 1 Build				
Analyst:	DK	Date:	1/31/22	Area type:	Urban
First year of analysis:	2027				
Last year of analysis:	2045				

Crash Data Description				
Freeway segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp terminals	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	

Estimated Crash Statistics

Crashes for Entire Facility	Total	K	A	B	C	PDO
Estimated number of crashes during Study Period, crashes:	1807.6	6.7	25.2	135.4	392.0	1248.2
Estimated average crash freq. during Study Period, crashes/yr:	95.1	0.4	1.3	7.1	20.6	65.7

Crashes by Facility Component	Nbr. Sites	Total	K	A	B	C	PDO
Freeway segments, crashes:	5	1385.8	5.8	16.0	88.7	283.3	992.0
Ramp segments, crashes:	9	68.8	0.7	2.0	11.3	17.3	37.6
Crossroad ramp terminals, crashes:	2	353.0	0.3	7.2	35.5	91.4	218.7

Crashes for Entire Facility by Year	Year	Total	K	A	B	C	PDO
Estimated number of crashes during the Study Period, crashes:	2027	95.1	0.4	1.3	7.1	20.6	65.7
	2028	95.1	0.4	1.3	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	1.3	7.1	20.6	65.7
	2038	95.1	0.4	1.3	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	1.3	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
	2046						
	2047						
	2048						
	2049						
	2050						

Distribution of Crashes for Entire Facility

Crash Type	Crash Type Category	Estimated Number of Crashes During the Study Period					
		Total	K	A	B	C	PDO
Multiple vehicle	Head-on crashes:	7.1	0.0	0.2	1.0	2.8	3.1
	Right-angle crashes:	106.6	0.2	2.2	11.4	30.5	62.3
	Rear-end crashes:	978.1	3.6	14.1	75.6	225.0	659.8
	Sideswipe crashes:	307.2	0.8	2.6	14.3	44.1	245.4
	Other multiple-vehicle crashes:	35.1	0.2	0.5	2.7	8.0	23.8
	Total multiple-vehicle crashes:	1434.1	4.9	19.6	104.9	310.4	994.3
Single vehicle	Crashes with animal:	5.1	0.0	0.0	0.1	0.3	4.7
	Crashes with fixed object:	271.4	1.3	4.0	21.8	58.1	186.2
	Crashes with other object:	36.6	0.1	0.2	1.2	3.6	31.4
	Crashes with parked vehicle:	5.9	0.0	0.1	0.4	1.2	4.1
	Other single-vehicle crashes	54.6	0.4	1.3	7.1	18.4	27.5
	Total single-vehicle crashes:	373.5	1.8	5.6	30.6	81.6	253.9
	Total crashes:	1807.6	6.7	25.2	135.4	392.0	1248.2

Evaluation Site Summary

General Information

Project description:	I-270 From MD 189 to Wootton Parkway_Phase 1 Build				
Analyst:	DK	Date:	1/31/22	Area type:	Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi):		0.600	
Last year of analysis:	2045				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
1	10	0.130	GP MP 5.50 - MP 5.37
2	10	0.160	GP MP 5.37 - MP 5.21
3	10	0.310	GP MP 5.21 - MP 4.90
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 Segments

Number	Study Period Description	Number	Study Period Description
1	G1-1 Ramp from I-270 NB t	21	0
2	G2-2 Ramp from MD 189 W	22	0
3	G3-3 Ramp from MD 189 W	23	0
4	G3-4 Ramp from MD 189 to	24	0
5	G4-5 Ramp from I-270 SB t	25	0
6	G4-6 Ramp from I-270 SB t	26	0
7	G5-7 Ramp from I-270 SB t	27	0
8	G6-8 Ramp from MD 189 Et	28	0
9	G6-9 Ramp from MD 189 to	29	0
10	G7-10 Ramp from MD 189 E	30	0
11	G8-11 Ramp from I-270 NB	31	0
12	G8-12 Ramp from I-270 NB	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

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
6	0	0	0

Output Summary

General Information					
Project description:	I-270 From MD 189 to Wootton Parkway_Phase 1 Build				
Analyst:	DK	Date:	1/31/22	Area type:	Urban
First year of analysis:	2027				
Last year of analysis:	2045				

Crash Data Description				
Freeway segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp terminals	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	

Estimated Crash Statistics							
Crashes for Entire Facility	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:	981.0	4.1	11.3	62.0	205.0	698.6
Estimated average crash freq. during Study Period, crashes/yr:	51.6	0.2	0.6	3.3	10.8	36.8

Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	3	936.7	3.6	10.1	56.0	194.8	672.2
Ramp segments, crashes:	12	44.3	0.4	1.2	6.1	10.3	26.3
Crossroad ramp terminals, crashes:	0	0.0	0.0	0.0	0.0	0.0	0.0

Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	51.6	0.2	0.6	3.3	10.8	36.8
	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
	2045	51.6	0.2	0.6	3.3	10.8	36.8
	2046						
	2047						
	2048						
	2049						
	2050						

Distribution of Crashes for Entire Facility

Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**C**	**PDO**
Multiple vehicle	Head-on crashes:	2.7	0.0	0.1	0.3	1.2	1.1
	Right-angle crashes:	15.9	0.1	0.2	1.3	4.5	9.9
	Rear-end crashes:	537.6	2.2	6.1	33.7	116.0	379.7
	Sideswipe crashes:	185.5	0.5	1.5	8.2	28.3	147.1
	Other multiple-vehicle crashes:	19.8	0.1	0.3	1.4	4.7	13.3
	Total multiple-vehicle crashes:	761.6	2.9	8.1	44.9	154.6	551.1
Single vehicle	Crashes with animal:	3.0	0.0	0.0	0.0	0.1	2.8
	Crashes with fixed object:	159.9	0.8	2.3	12.3	36.2	108.3
	Crashes with other object:	22.2	0.0	0.1	0.7	2.4	18.8
	Crashes with parked vehicle:	3.0	0.0	0.0	0.2	0.7	2.1
	Other single-vehicle crashes	31.3	0.3	0.7	3.8	11.0	15.5
	Total single-vehicle crashes:	219.4	1.1	3.2	17.1	50.4	147.5
	Total crashes:	981.0	4.1	11.3	62.0	205.0	698.6

Evaluation Site Summary

General Information

Project description:	I-270 From Wootton Pkwy to Montrose Rd_Phase 1 Build				
Analyst:	NK	Date:	1/31/22	Area type:	Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi):		0.770	
Last year of analysis:	2045				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
1	10	0.510	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	0.000	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 Segments

Number	Study Period Description	Number	Study Period Description
1	MT1-1 Ramp from I-270 SB	21	0
2	MT1-2 Ramp from I-270 SB	22	0
3	MT2-1 Ramp from Wootton	23	0
4	MT3-1 Ramp from Wootton	24	0
5	MT4-1 Ramp from I-270 NB	25	0
6	MT4-2 Ramp from I-270 NB	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

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
6	0	0	0

Output Summary

General Information					
Project description:	I-270 From Wootton Pkwy to Montrose Rd_Phase 1 Build				
Analyst:	NK	Date:	1/31/22	Area type:	Urban
First year of analysis:	2027				
Last year of analysis:	2045				

Crash Data Description				
Freeway segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp terminals	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	

Estimated Crash Statistics

Crashes for Entire Facility	Total	K	A	B	C	PDO
Estimated number of crashes during Study Period, crashes:	949.0	4.0	11.2	61.6	213.4	658.9
Estimated average crash freq. during Study Period, crashes/yr:	49.9	0.2	0.6	3.2	11.2	34.7

Crashes by Facility Component	Nbr. Sites	Total	K	A	B	C	PDO
Freeway segments, crashes:	5	912.6	3.7	10.2	56.7	204.2	637.7
Ramp segments, crashes:	6	36.5	0.3	1.0	4.9	9.1	21.2
Crossroad ramp terminals, crashes:	0	0.0	0.0	0.0	0.0	0.0	0.0

Crashes for Entire Facility by Year	Year	Total	K	A	B	C	PDO
Estimated number of crashes during the Study Period, crashes:	2027	49.9	0.2	0.6	3.2	11.2	34.7
	2028	49.9	0.2	0.6	3.2	11.2	34.7
	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 Crashes for Entire Facility

Crash Type	Crash Type Category	Estimated Number of Crashes During the Study Period					
		Total	K	A	B	C	PDO
Multiple vehicle	Head-on crashes:	2.7	0.0	0.1	0.3	1.2	1.1
	Right-angle crashes:	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-vehicle crashes:	18.8	0.1	0.2	1.3	4.6	12.5
	Total multiple-vehicle crashes:	730.1	2.8	7.7	42.9	153.4	523.3
Single vehicle	Crashes with animal:	2.9	0.0	0.0	0.1	0.2	2.6
	Crashes with fixed object:	159.6	0.9	2.5	13.4	43.1	99.7
	Crashes with other object:	21.2	0.1	0.2	0.8	2.9	17.2
	Crashes with parked vehicle:	2.9	0.0	0.0	0.2	0.8	1.8
	Other single-vehicle crashes	32.3	0.3	0.8	4.1	12.9	14.2
	Total single-vehicle crashes:	218.9	1.2	3.5	18.7	59.9	135.6
Total crashes:		949.0	4.0	11.2	61.6	213.4	658.9

Evaluation Site Summary

General Information

Project description:	I-270 From Montrose Rd to I-270 Y_Phase 1 Build				
Analyst:	NK	Date:	1/31/22	Area type:	Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi):		1.580	
Last year of analysis:	2045				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
1	10	0.030	GP MP 4.18 - MP 4.15
2	10	0.040	GP MP 4.15 - MP 4.11
3	10	0.110	GP MP 4.11 - MP 4.00
4	10	0.040	GP MP 4.00 - MP 3.96
5	10	1.070	GP MP 3.96 - MP 2.89
6	10	0.020	GP MP 2.89 - MP 2.87
7	10	0.220	GP MP 2.87 - MP 2.65
8	6	0.050	GP MP 2.65 - MP 2.60
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 Segments

Number	Study Period Description		Number	Study Period Description	
1	C1-1 Ramp from I-270 NB to		21	0	
2	C2-1 Ramp from Tower Oak		22	0	
3	C2-2 Ramp from Montrose F		23	0	
4	C3-1 Ramp from Montrose F		24	0	
5	C4-1 Ramp from I-270 NB to		25	0	
6	C5-1 Ramp from I-270 Sb to		26	0	
7	C6-1 Ramp from Montrose F		27	0	
8	C6-2 Ramp from Montrose F		28	0	
9	C6-3 Ramp from Montrose F		29	0	
10	C7-1 Ramp from Montrose F		30	0	
11	C7-2 Ramp from Montrose F		31	0	
12	C8-1 Ramp from I-270 SB to		32	0	
13	C8-2 Ramp from I-270 SB to		33	0	
14	C8-3 Ramp from 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	
19	0		39	0	
20	0		40	0	

Crossroad Ramp Terminals

Number	Config.	Control	Study Period Description
1	B2	Signal	I-270 NB at Tower Oaks Blvd/Geico Entrance
2	0	0	0
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0

Output Summary

General Information					
Project description:	I-270 From Montrose Rd to I-270 Y_Phase 1 Build				
Analyst:	NK	Date:	1/31/22	Area type:	Urban
First year of analysis:	2027				
Last year of analysis:	2045				

Crash Data Description				
Freeway segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp terminals	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	

Estimated Crash Statistics							
Crashes for Entire Facility		**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:		2095.3	8.1	24.5	135.0	465.4	1462.3
Estimated average crash freq. during Study Period, crashes/yr:		110.3	0.4	1.3	7.1	24.5	77.0
Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	8	1870.4	7.3	20.3	112.8	406.3	1323.8
Ramp segments, crashes:	16	76.5	0.8	2.4	11.5	17.4	44.4
Crossroad ramp terminals, crashes:	1	148.4	0.1	1.7	10.7	41.8	94.1
Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	110.3	0.4	1.3	7.1	24.5	77.0
	2028	110.3	0.4	1.3	7.1	24.5	77.0
	2029	110.3	0.4	1.3	7.1	24.5	77.0
	2030	110.3	0.4	1.3	7.1	24.5	77.0
	2031	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
	2033	110.3	0.4	1.3	7.1	24.5	77.0
	2034	110.3	0.4	1.3	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	1.3	7.1	24.5	77.0
	2038	110.3	0.4	1.3	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
	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	7.1	24.5	77.0
	2046						
	2047						
	2048						
	2049						
	2050						

Distribution of Crashes for Entire Facility							
Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**C**	**PDO**
Multiple vehicle	Head-on crashes:	6.7	0.0	0.1	0.8	2.9	2.9
	Right-angle crashes:	66.4	0.2	0.9	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	2.9	15.9	57.2	301.1
	Other multiple-vehicle crashes:	41.6	0.2	0.5	2.9	9.9	28.2
	Total multiple-vehicle crashes:	1631.9	5.6	17.1	95.8	345.4	1168.0
Single vehicle	Crashes with animal:	6.3	0.0	0.0	0.1	0.4	5.7
	Crashes with fixed object:	337.5	1.8	5.3	28.1	86.3	215.9
	Crashes with other object:	44.4	0.1	0.3	1.7	5.7	36.6
	Crashes with parked vehicle:	6.8	0.0	0.1	0.5	1.7	4.4
	Other single-vehicle crashes	68.4	0.6	1.6	8.7	26.0	31.6
	Total single-vehicle crashes:	463.4	2.6	7.4	39.2	120.1	294.2
	Total crashes:	2095.3	8.1	24.5	135.0	465.4	1462.3

Evaluation Site Summary

General Information

Project description:	I-270 From I-270 Y to Rockledge Blvd_Phase 1 Build				
Analyst:	NK	Date:	1/31/22	Area type:	Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi):		0.730	
Last year of analysis:	2045				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
1	6	0.460	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	0.000	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 Segments

Number	Study Period Description		Number	Study Period Description	
1	0		21	0	
2	0		22	0	
3	0		23	0	
4	0		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	

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
6	0	0	0

Output Summary

General Information

Project description:	I-270 From I-270 Y to Rockledge 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 Description

Freeway segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp terminals	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	

Estimated Crash Statistics

Crashes for Entire Facility	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:	415.9	1.8	5.1	28.2	88.4	292.4
Estimated average crash freq. during Study Period, crashes/yr:	21.9	0.1	0.3	1.5	4.7	15.4

Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	3	415.9	1.8	5.1	28.2	88.4	292.4
Ramp segments, crashes:	0	0.0	0.0	0.0	0.0	0.0	0.0
Crossroad ramp terminals, crashes:	0	0.0	0.0	0.0	0.0	0.0	0.0

Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	21.9	0.1	0.3	1.5	4.7	15.4
	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
	2046						
	2047						
	2048						
	2049						
	2050						

Distribution of Crashes for Entire Facility

Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**C**	**PDO**
Multiple vehicle	Head-on crashes:	1.1	0.0	0.0	0.2	0.5	0.4
	Right-angle crashes:	6.4	0.0	0.1	0.6	1.9	3.8
	Rear-end crashes:	217.2	1.0	2.8	15.7	49.1	148.6
	Sideswipe crashes:	72.6	0.3	0.7	3.9	12.1	55.7
	Other multiple-vehicle crashes:	7.6	0.0	0.1	0.6	1.9	4.9
	Total multiple-vehicle crashes:	305.0	1.4	3.8	20.9	65.5	213.5
Single vehicle	Crashes with animal:	1.8	0.0	0.0	0.0	0.1	1.7
	Crashes with fixed object:	80.0	0.3	0.9	5.2	16.5	57.0
	Crashes with other object:	12.8	0.0	0.1	0.4	1.3	11.0
	Crashes with parked vehicle:	1.5	0.0	0.0	0.1	0.3	1.1
	Other single-vehicle crashes	14.8	0.1	0.3	1.5	4.8	8.1
	Total single-vehicle crashes:	110.9	0.5	1.3	7.3	22.9	78.9
	Total crashes:	415.9	1.8	5.1	28.2	88.4	292.4

Evaluation Site Summary

General Information

Project description:	I-270 From Rockledge Blvd to MD 187				
Analyst:	NK	Date:	1/31/22	Area type:	Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi):		0.290	
Last year of analysis:	2045				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
1	4	0.180	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	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 Segments

Number	Study Period Description		Number	Study Period Description	
1	G3-1 Ramp from I-270SB to		21	0	
2	G8-2 Ramp from Rockledge		22	0	
3	G2-3 Ramp from I-270 NB t		23	0	
4	G4-4 Ramp from 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	

Crossroad Ramp Terminals

Number	Config.	Control	Study Period Description
1	D4	Signal	Rockledge Blvd at I-270 NB
2	D4	Signal	Rockledge Blvd at I-270 SB
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0

Output Summary

General Information

Project description:	I-270 From Rockledge Blvd to MD 187				
Analyst:	NK	Date:	1/31/22	Area type:	Urban
First year of analysis:	2027				
Last year of analysis:	2045				

Crash Data Description

Freeway segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp terminals	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	

Estimated Crash Statistics

Crashes for Entire Facility	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:	643.2	1.4	7.5	41.4	163.2	429.7
Estimated average crash freq. during Study Period, crashes/yr:	33.9	0.1	0.4	2.2	8.6	22.6

Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	3	176.3	0.7	2.0	11.5	39.0	123.1
Ramp segments, crashes:	4	57.8	0.5	1.6	6.5	16.4	32.8
Crossroad ramp terminals, crashes:	2	409.2	0.2	3.9	23.5	107.8	273.8

Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	33.9	0.1	0.4	2.2	8.6	22.6
	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
	2037	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						
	2047						
	2048						
	2049						
	2050						

Distribution of Crashes for Entire Facility

Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**C**	**PDO**
Multiple vehicle	Head-on crashes:	4.0	0.0	0.1	0.3	1.4	2.2
	Right-angle crashes:	98.2	0.1	1.1	6.3	28.8	62.0
	Rear-end crashes:	334.5	0.5	3.7	21.6	90.3	218.4
	Sideswipe crashes:	81.7	0.1	0.5	2.7	10.1	68.4
	Other multiple-vehicle crashes:	11.5	0.0	0.1	0.6	2.2	8.6
	Total multiple-vehicle crashes:	529.9	0.7	5.4	31.5	132.8	359.5
Single vehicle	Crashes with animal:	0.9	0.0	0.0	0.0	0.1	0.8
	Crashes with fixed object:	85.1	0.5	1.5	7.0	21.3	54.9
	Crashes with other object:	6.8	0.0	0.1	0.3	1.0	5.5
	Crashes with parked vehicle:	1.8	0.0	0.0	0.1	0.4	1.2
	Other single-vehicle crashes	18.7	0.2	0.5	2.5	7.7	7.8
	Total single-vehicle crashes:	113.3	0.7	2.1	9.9	30.4	70.2
	Total crashes:	643.2	1.4	7.5	41.4	163.2	429.7

Evaluation Site Summary

General Information

Project description:	I-270 From MD 187 to MD 355/I-495				
Analyst:	NK	Date:	1/31/22	Area type:	Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi):		1.420	
Last year of analysis:	2045				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
1	4	0.140	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 Segments

Number	Study Period Description	Number	Study Period Description
1	G2-1 Ramp from I-270 NB t	21	0
2	G4-2 Ramp from MD 187 NI	22	0
3	G4-3 Ramp from MD 187 NI	23	0
4	G6-4 Ramp from I-270 SB t	24	0
5	G6-5 Ramp from I-270 SB t	25	0
6	G8-6 Ramp from MD 187 to	26	0
7	G8-10 Ramp from MD 187 t	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

Crossroad Ramp Terminals

Number	Config.	Control	Study Period Description
1	D4	Signal	MD 187 at I-270 NB
2	D4	Signal	MD 187 at I-270 SB
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0

Output Summary

General Information

Project description:	I-270 From MD 187 to MD 355/I-495				
Analyst:	NK	Date:	1/31/22	Area type:	Urban
First year of analysis:	2027				
Last year of analysis:	2045				

Crash Data Description

Freeway segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp terminals	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	

Estimated Crash Statistics

Crashes for Entire Facility	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:	1617.9	5.2	19.8	112.8	450.2	1029.9
Estimated average crash freq. during Study Period, crashes/yr:	85.2	0.3	1.0	5.9	23.7	54.2

Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	6	996.2	4.4	12.0	65.9	213.6	700.4
Ramp segments, crashes:	7	66.6	0.6	1.7	7.3	19.2	37.9
Crossroad ramp terminals, crashes:	2	555.0	0.2	6.0	39.6	217.5	291.7

Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	85.2	0.3	1.0	5.9	23.7	54.2
	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
	2031	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	1.0	5.9	23.7	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						
	2047						
	2048						
	2049						
	2050						

Distribution of Crashes for Entire Facility

Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**C**	**PDO**
Multiple vehicle	Head-on crashes:	7.9	0.0	0.1	0.8	3.7	3.2
	Right-angle crashes:	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-vehicle crashes:	29.4	0.1	0.4	2.0	7.2	19.7
	Total multiple-vehicle crashes:	1316.4	3.7	15.1	89.0	372.0	836.7
Single vehicle	Crashes with animal:	3.5	0.0	0.0	0.1	0.2	3.2
	Crashes with fixed object:	219.8	1.1	3.3	16.9	54.9	143.6
	Crashes with other object:	27.3	0.1	0.2	1.0	3.3	22.8
	Crashes with parked vehicle:	4.6	0.0	0.1	0.3	1.1	3.1
	Other single-vehicle crashes	46.3	0.3	1.1	5.6	18.7	20.6
	Total single-vehicle crashes:	301.5	1.5	4.6	23.8	78.2	193.3
	Total crashes:	1617.9	5.2	19.8	112.8	450.2	1029.9

Evaluation Site Summary

General Information

Project description:	I-270 West Spur From Westlake Terrace to I-270_Phase 1 Build				
Analyst:	DK	Date:	1/31/22	Area type:	Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi):		0.660	
Last year of analysis:	2045				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
1	7	0.140	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 Segments

Number	Study Period Description	Number	Study Period Description
1	M3-1 Ramp from Westlake T	21	0
2	M5-2 Ramp from I-270 Y SB	22	0
3	M-3 Ramp from I-270 Y NB	23	0
4	M-4 Ramp from Westlake T	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

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
6	0	0	0

Output Summary

General Information

Project description:	I-270 West Spur From Westlake Terrace to I-270_Phase 1 Build				
Analyst:	DK	Date:	1/31/22	Area type:	Urban
First year of analysis:	2027				
Last year of analysis:	2045				

Crash Data Description

Freeway segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp terminals	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	

Estimated Crash Statistics

Crashes for Entire Facility	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:	607.4	3.0	8.3	45.1	125.4	425.6
Estimated average crash freq. during Study Period, crashes/yr:	32.0	0.2	0.4	2.4	6.6	22.4

Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	2	573.8	2.7	7.4	40.3	116.9	406.6
Ramp segments, crashes:	4	33.6	0.3	0.9	4.8	8.5	18.9
Crossroad ramp terminals, crashes:	0	0.0	0.0	0.0	0.0	0.0	0.0

Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	32.0	0.2	0.4	2.4	6.6	22.4
	2028	32.0	0.2	0.4	2.4	6.6	22.4
	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						
	2048						
	2049						
	2050						

Distribution of Crashes for Entire Facility

Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**C**	**PDO**
Multiple vehicle	Head-on crashes:	1.5	0.0	0.0	0.2	0.7	0.6
	Right-angle crashes:	9.6	0.1	0.2	0.9	2.6	5.9
	Rear-end crashes:	310.5	1.6	4.2	23.2	67.0	214.5
	Sideswipe crashes:	112.5	0.4	1.0	5.6	16.1	89.4
	Other multiple-vehicle crashes:	11.1	0.1	0.2	0.9	2.7	7.2
	Total multiple-vehicle crashes:	445.3	2.1	5.6	30.9	89.1	317.6
Single vehicle	Crashes with animal:	2.0	0.0	0.0	0.0	0.1	1.8
	Crashes with fixed object:	117.1	0.7	1.9	10.1	25.8	78.6
	Crashes with other object:	17.0	0.0	0.1	0.6	1.8	14.5
	Crashes with parked vehicle:	2.4	0.0	0.0	0.2	0.5	1.7
	Other single-vehicle crashes	23.6	0.2	0.6	3.3	8.2	11.3
	Total single-vehicle crashes:	162.1	0.9	2.7	14.2	36.3	108.0
	Total crashes:	607.4	3.0	8.3	45.1	125.4	425.6

Evaluation Site Summary

General Information

Project description:	I-270 West Spur From Democracy Blvd to Westlake Terrace_Phase 1 Build				
Analyst:	DK	Date:	1/31/22	Area type:	Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi):		0.350	
Last year of analysis:	2045				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
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	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 Segments

Number	Study Period Description	Number	Study Period Description
1	G1-1 Ramp from I-270 Y NB	21	0
2	G1-2 Ramp from I-270 Y NB	22	0
3	G2-3 Ramp from Democrac	23	0
4	G3-4 Ramp from Democrac	24	0
5	G4-5 Ramp from I-270 Y NB	25	0
6	G4-6 Ramp from I-270 Y NB	26	0
7	G4-7 Ramp from I-270 Y NB	27	0
8	G7-10 Ramp from Democra	28	0
9	G7-11 Ramp from Democra	29	0
10	G5-8 Ramp from I-270 Y SB	30	0
11	G5-9 Ramp from I-270 Y SB	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

Crossroad Ramp Terminals

Number	Config.	Control	Study Period Description
1	D3ex	Signal	Democracy Boulevard at I-270Y NB
2	D4	Signal	Democracy Boulevard at I-270Y SB
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0

Output Summary

General Information					
Project description:	I-270 West Spur From Democracy Blvd to Westlake Terrace_Phase 1 Build				
Analyst:	DK	Date:	1/31/22	Area type:	Urban
First year of analysis:	2027				
Last year of analysis:	2045				

Crash Data Description				
Freeway segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp terminals	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	

Estimated Crash Statistics							
Crashes for Entire Facility		**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:		715.1	2.1	9.6	56.3	211.3	435.8
Estimated average crash freq. during Study Period, crashes/yr:		37.6	0.1	0.5	3.0	11.1	22.9
Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	4	273.2	1.4	3.7	20.3	57.9	189.9
Ramp segments, crashes:	11	56.5	0.5	1.6	8.6	13.2	32.6
Crossroad ramp terminals, crashes:	2	385.4	0.2	4.3	27.3	140.2	213.3
Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	37.6	0.1	0.5	3.0	11.1	22.9
	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 Crashes for Entire Facility							
Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**C**	**PDO**
Multiple vehicle	Head-on crashes:	4.2	0.0	0.1	0.4	1.9	1.8
	Right-angle crashes:	96.3	0.1	1.2	7.6	37.7	49.8
	Rear-end crashes:	377.0	0.9	4.9	29.4	121.4	220.4
	Sideswipe crashes:	96.7	0.2	0.7	4.1	14.0	77.8
	Other multiple-vehicle crashes:	12.0	0.0	0.1	0.8	2.7	8.2
	Total multiple-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 other object:	9.4	0.0	0.1	0.5	1.2	7.6
	Crashes with parked vehicle:	2.1	0.0	0.0	0.2	0.5	1.4
	Other single-vehicle crashes	21.6	0.2	0.6	3.5	8.7	8.5
	Total single-vehicle crashes:	128.9	0.8	2.6	14.0	33.7	77.8
	Total crashes:	715.1	2.1	9.6	56.3	211.3	435.8

Evaluation Site Summary

General Information

Project description:	I-270 West Spur From I-495 to Democracy Blvd_Phase 1 Build				
Analyst:	DK	Date:	1/31/22	Area type:	Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi):		0.800	
Last year of analysis:	2045				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
1	6	0.280	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 Segments

Number	Study Period Description		Number	Study Period Description	
1	0		21	0	
2	0		22	0	
3	0		23	0	
4	0		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	

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
6	0	0	0

Output Summary

General Information					
Project description:	I-270 West Spur From I-495 to Democracy Blvd_Phase 1 Build				
Analyst:	DK	Date:	1/31/22	Area type:	Urban
First year of analysis:	2027				
Last year of analysis:	2045				

Crash Data Description				
Freeway segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp terminals	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	

Estimated Crash Statistics							
Crashes for Entire Facility		**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:		856.5	3.3	9.1	50.9	168.1	625.1
Estimated average crash freq. during Study Period, crashes/yr:		45.1	0.2	0.5	2.7	8.8	32.9
Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	6	856.5	3.3	9.1	50.9	168.1	625.1
Ramp segments, crashes:	0	0.0	0.0	0.0	0.0	0.0	0.0
Crossroad ramp terminals, crashes:	0	0.0	0.0	0.0	0.0	0.0	0.0
Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	45.1	0.2	0.5	2.7	8.8	32.9
	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
	2031	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
	2041	45.1	0.2	0.5	2.7	8.8	32.9
	2042	45.1	0.2	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						

Distribution of Crashes for Entire Facility

Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**C**	**PDO**
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-vehicle crashes:	15.1	0.1	0.2	1.0	3.3	10.5
	Total multiple-vehicle 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
	Crashes with fixed object:	152.8	0.6	1.6	9.1	30.1	111.3
	Crashes with other object:	23.1	0.0	0.1	0.7	2.4	19.7
	Crashes with parked vehicle:	1.7	0.0	0.0	0.1	0.4	1.2
	Other single-vehicle crashes	25.9	0.2	0.5	2.6	8.6	14.1
	Total single-vehicle crashes:	207.0	0.8	2.3	12.6	41.6	149.8
	Total crashes:	856.5	3.3	9.1	50.9	168.1	625.1

Evaluation Site Summary

General Information

Project description:	I-495 VA From VA 193 (Southern Study Limit) to GWMP_Phase 1 Build				
Analyst:	DK	Date:	1/31/22	Area type:	Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi):	1.352		
Last year of analysis:	2045				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
1	10	0.254	GP MP 13.72 - MP 13.97
2	9	0.010	GP MP 13.97 - MP 13.97
3	9	0.183	GP MP 13.97 - MP 14.15
4	8	0.207	GP MP 14.15 - MP 14.36
5	9	0.178	GP MP 14.36 - MP 14.54
6	9	0.361	GP MP 14.54 - MP 14.90
7	8	0.015	GP MP 14.90 - MP 14.91
8	9	0.145	GP MP 14.92 - 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 Segments

Number	Study Period Description	Number	Study Period Description
1	Ramp from VA 193 WB to I-	21	0
2	Ramp from VA 193 WB to I-	22	0
3	Ramp from I-495 SB C-D R	23	0
4	Ramp from I-495 SB to VA	24	0
5	Ramp from I-495 NB to VA	25	0
6	Ramp from I-495 SB GP to	26	0
7	SB CD-1 I-495 SB	27	0
8	SB CD-2 from I-495 SB to V	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

Crossroad Ramp Terminals

Number	Config.	Control	Study Period Description
1	D4	Signal	VA 193 at I-495 NB
2	D4	Signal	VA 193 at I-495 SB
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0

Output Summary						
General Information						
Project description:	I-495 VA From VA 193 (Southern Study Limit) to GWMP_Phase 1 Build					
Analyst:	DK	Date:	4/7/2022	Area type:	Urban	
First year of analysis:	2027					
Last year of analysis:	2045					
Crash Data Description						
Freeway segments	Segment crash data available?		No	First year of crash data:		
	Project-level crash data available?		No	Last year of crash data:		
Ramp segments	Segment crash data available?		No	First year of crash data:		
	Project-level crash data available?		No	Last year of crash data:		
Ramp terminals	Segment crash data available?		No	First year of crash data:		
	Project-level crash data available?		No	Last year of crash data:		

Estimated Crash Statistics							
Crashes for Entire Facility		**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:		2460.2	6.5	20.5	139.8	554.2	1739.2
Estimated average crash freq. during Study Period, crashes/yr:		129.5	0.3	1.1	7.4	29.2	91.5
Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	8	1996.1	5.8	15.9	112.8	433.9	1427.6
Ramp segments, crashes:	8	86.7	0.6	1.7	8.6	19.3	56.5
Crossroad ramp terminals, crashes:	2	377.3	0.1	2.8	18.4	100.9	255.1
Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	129.5	0.3	1.1	7.4	29.2	91.5
	2028	129.5	0.3	1.1	7.4	29.2	91.5
	2029	129.5	0.3	1.1	7.4	29.2	91.5
	2030	129.5	0.3	1.1	7.4	29.2	91.5
	2031	129.5	0.3	1.1	7.4	29.2	91.5
	2032	129.5	0.3	1.1	7.4	29.2	91.5
	2033	129.5	0.3	1.1	7.4	29.2	91.5
	2034	129.5	0.3	1.1	7.4	29.2	91.5
	2035	129.5	0.3	1.1	7.4	29.2	91.5
	2036	129.5	0.3	1.1	7.4	29.2	91.5
	2037	129.5	0.3	1.1	7.4	29.2	91.5
	2038	129.5	0.3	1.1	7.4	29.2	91.5
	2039	129.5	0.3	1.1	7.4	29.2	91.5
	2040	129.5	0.3	1.1	7.4	29.2	91.5
	2041	129.5	0.3	1.1	7.4	29.2	91.5
	2042	129.5	0.3	1.1	7.4	29.2	91.5
	2043	129.5	0.3	1.1	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 Crashes for Entire Facility							
Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**C**	**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	11.6	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-vehicle crashes:	2019.0	4.9	15.8	109.7	445.5	1443.1
Single vehicle	Crashes with animal:	6.0	0.0	0.0	0.1	0.3	5.5
	Crashes with fixed object:	320.7	1.2	3.3	21.6	77.5	217.2
	Crashes with other object:	44.3	0.1	0.2	1.4	5.2	37.4
	Crashes with parked vehicle:	6.6	0.0	0.1	0.4	1.5	4.6
	Other single-vehicle crashes	63.5	0.4	1.0	6.7	24.0	31.4
	Total single-vehicle crashes:	441.2	1.6	4.7	30.1	108.6	296.1
Total crashes:		2460.2	6.5	20.5	139.8	554.2	1739.2

Evaluation Site Summary

General Information

Project description:	I-495 VA From GWMP to MD State Line_Phase 1 Build				
Analyst:	DK	Date:	1/31/22	Area type:	Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi):		0.345	
Last year of analysis:	2045				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
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	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 Segments

Number	Study Period Description	Number	Study Period Description
1	Ramp from I-495 SB ML to (	21	0
2	Ramp from I-495 SB ML to I	22	0
3	Ramp from I-495 NB ML to (	23	0
4	Ramp from I-495 SB ML to (	24	0
5	Ramp from I-495 NB ML an	25	0
6	Ramp from I-495 SB to GWI	26	0
7	Ramp from I-495 SB GP an	27	0
8	Ramp from GWMP WB to I-	28	0
9	Ramp from GWMP WB to I-	29	0
10	Ramp from GWMP WB to I-	30	0
11	Ramp from I-495 NB to GW	31	0
12	Ramp from I-495 NB to GW	32	0
13	Ramp from I-495 NB to I-49	33	0
14	Ramp from GWMP WB to I-	34	0
15	Ramp from I-495 NB and G	35	0
16	Ramp from GWMP WB to I-	36	0
17	0	37	0
18	0	38	0
19	0	39	0
20	0	40	0

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
6	0	0	0

Output Summary

General Information

Project description:	I-495 VA From GWMP to MD State Line_Phase 1 Build				
Analyst:	DK	Date:	4/7/2022	Area type:	Urban
First year of analysis:	2027				
Last year of analysis:	2045				

Crash Data Description

Freeway segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp terminals	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	

Estimated Crash Statistics

Crashes for Entire Facility	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:	687.2	2.4	7.0	47.2	148.2	482.4
Estimated average crash freq. during Study Period, crashes/yr:	36.2	0.1	0.4	2.5	7.8	25.4

Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	2	549.6	1.4	4.0	28.8	118.2	397.1
Ramp segments, crashes:	16	137.6	1.0	3.0	18.4	30.0	85.3
Crossroad ramp terminals, crashes:	0	0.0	0.0	0.0	0.0	0.0	0.0

Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	36.2	0.1	0.4	2.5	7.8	25.4
	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
	2045	36.2	0.1	0.4	2.5	7.8	25.4
	2046						
	2047						
	2048						
	2049						
	2050						

Distribution of Crashes for Entire Facility

Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**C**	**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	0.8	5.5	19.0	106.9
	Other multiple-vehicle crashes:	22.1	0.1	0.4	2.3	5.5	13.9
	Total multiple-vehicle crashes:	537.5	1.7	5.0	33.8	110.7	386.3
Single vehicle	Crashes with animal:	1.9	0.0	0.0	0.0	0.1	1.7
	Crashes with fixed object:	110.3	0.5	1.4	9.6	27.0	71.8
	Crashes with other object:	12.5	0.0	0.1	0.4	1.5	10.5
	Crashes with parked vehicle:	2.2	0.0	0.0	0.2	0.5	1.4
	Other single-vehicle crashes	22.8	0.2	0.5	3.1	8.3	10.8
	Total single-vehicle crashes:	149.7	0.7	2.0	13.4	37.5	96.1
Total crashes:		687.2	2.4	7.0	47.2	148.2	482.4

Evaluation Site Summary

General Information

Project description:	I-495 MD From VA State Line to MD 190_Phase 1 Build				
Analyst:	DK	Date:	1/31/22	Area type:	Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi):		2.400	
Last year of analysis:	2045				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
1	10	0.320	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 Segments

Number	Study Period Description	Number	Study Period Description
1	Ramp from CBP EB to I-495	21	0
2	Ramp from CBP EB to I-495	22	0
3	Ramp from CBP EB to I-495	23	0
4	Ramp from I-495 NB to CBP	24	0
5	Ramp from I-495 NB to CBP	25	0
6	Ramp from I-495 NB to CBP	26	0
7	Ramp from CBP WB to I-49	27	0
8	Ramp from I-495 SB to CBP	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

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
6	0	0	0

Output Summary						
General Information						
Project description:	I-495 MD From VA State Line to MD 190_Phase 1 Build					
Analyst:	DK	Date:	4/7/2022	Area type:	Urban	
First year of analysis:	2027					
Last year of analysis:	2045					
Crash Data Description						
Freeway segments	Segment crash data available?		No	First year of crash data:		
	Project-level crash data available?		No	Last year of crash data:		
Ramp segments	Segment crash data available?		No	First year of crash data:		
	Project-level crash data available?		No	Last year of crash data:		
Ramp terminals	Segment crash data available?		No	First year of crash data:		
	Project-level crash data available?		No	Last year of crash data:		

Estimated Crash Statistics							
Crashes for Entire Facility		**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:		4335.0	11.4	31.8	226.6	958.2	3107.1
Estimated average crash freq. during Study Period, crashes/yr:		228.2	0.6	1.7	11.9	50.4	163.5
Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	9	4289.2	11.0	30.7	219.2	947.2	3081.1
Ramp segments, crashes:	8	45.8	0.4	1.1	7.4	11.0	25.9
Crossroad ramp terminals, crashes:	0	0.0	0.0	0.0	0.0	0.0	0.0
Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	228.2	0.6	1.7	11.9	50.4	163.5
	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
	2041	228.2	0.6	1.7	11.9	50.4	163.5
	2042	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 Crashes for Entire Facility							
Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**C**	**PDO**
Multiple vehicle	Head-on crashes:	12.6	0.1	0.2	1.4	5.8	5.2
	Right-angle crashes:	74.9	0.3	0.7	5.1	22.0	46.8
	Rear-end crashes:	2507.2	6.6	18.5	131.6	561.2	1789.4
	Sideswipe crashes:	868.1	1.6	4.5	31.8	136.3	694.0
	Other multiple-vehicle crashes:	91.1	0.3	0.8	5.6	22.8	61.6
	Total multiple-vehicle crashes:	3553.8	8.8	24.6	175.5	748.0	2596.9
Single vehicle	Crashes with animal:	11.3	0.0	0.0	0.2	0.6	10.5
	Crashes with fixed object:	562.4	1.8	5.2	36.7	150.8	367.9
	Crashes with other object:	86.3	0.1	0.4	2.6	11.2	72.0
	Crashes with parked vehicle:	11.1	0.0	0.1	0.7	2.9	7.3
	Other single-vehicle crashes	110.0	0.5	1.5	10.9	44.6	52.4
	Total single-vehicle crashes:	781.2	2.6	7.2	51.1	210.2	510.1
Total crashes:		4335.0	11.4	31.8	226.6	958.2	3107.1

Evaluation Site Summary

General Information

Project description:	I-495 From MD 190 to I-270 West Spur_Phase 1 Build				
Analyst:	SMT	Date:	1/31/22	Area type:	Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi):		1.510	
Last year of analysis:	2045				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
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
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 Segments

Number	Study Period Description	Number	Study Period Description
1	R0-1 Ramp from CJP NB to	21	T4-16.1 Ramp from I-495 SI
2	R9-2 Ramp from I-495 NB G	22	T3-17 Ramp from MD 190 t
3	R9-3 Ramp from I-495 NB G	23	T3-17.1 Ramp from MD 190
4	R11-4 Ramp from CJP NB t	24	R2-18 Ramp from MD 190 t
5	R11-4.1 Ramp from CJP NE	25	R2-18.1 Ramp from MD 190
6	R0-5 Ramp from CJP NB to	26	0
7	T1-6 Ramp from I-495 NB M	27	0
8	T1-6.1 Ramp from I-495 NE	28	0
9	T2-7 Ramp from MD 190 to	29	0
10	T2-7.1 Ramp from MD 190 t	30	0
11	R0-8 Ramp from SB I-495 M	31	0
12	R0-9 Ramp from SB I-495 G	32	0
13	R6-10 Ramp from MD 190 t	33	0
14	R6-11 Ramp from MD 190 a	34	0
15	R6-12 Ramp from MD 190 a	35	0
16	R6-13 Ramp from MD 190 t	36	0
17	R10-14 Ramp from MD 190	37	0
18	R5-15 Ramp from I-495 SB	38	0
19	R5-15.1 Ramp from I-495 S	39	0
20	T4-16 Ramp from I-495 SB	40	0

Crossroad Ramp Terminals

Number	Config.	Control	Study Period Description
1	D4	Signal	MD 190 at I-495 NB
2	D4	Signal	MD 190 at I-495 SB
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0

Output Summary

General Information

Project description:	I-495 From MD 190 to I-270 West Spur_Phase 1 Build				
Analyst:	SMT	Date:	4/7/2022	Area type:	Urban
First year of analysis:	2027				
Last year of analysis:	2045				

Crash Data Description

Freeway segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp terminals	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	

Estimated Crash Statistics

Crashes for Entire Facility	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:	3161.2	8.4	28.5	191.4	784.2	2148.7
Estimated average crash freq. during Study Period, crashes/yr:	166.4	0.4	1.5	10.1	41.3	113.1

Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	5	2481.0	6.7	18.7	133.4	541.1	1781.0
Ramp segments, crashes:	25	188.8	1.4	4.3	22.1	45.9	115.1
Crossroad ramp terminals, crashes:	2	491.4	0.2	5.5	35.9	197.2	252.6

Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	166.4	0.4	1.5	10.1	41.3	113.1
	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	1.5	10.1	41.3	113.1
	2033	166.4	0.4	1.5	10.1	41.3	113.1
	2034	166.4	0.4	1.5	10.1	41.3	113.1
	2035	166.4	0.4	1.5	10.1	41.3	113.1
	2036	166.4	0.4	1.5	10.1	41.3	113.1
	2037	166.4	0.4	1.5	10.1	41.3	113.1
	2038	166.4	0.4	1.5	10.1	41.3	113.1
	2039	166.4	0.4	1.5	10.1	41.3	113.1
	2040	166.4	0.4	1.5	10.1	41.3	113.1
	2041	166.4	0.4	1.5	10.1	41.3	113.1
	2042	166.4	0.4	1.5	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 Crashes for Entire Facility

Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**C**	**PDO**
Multiple vehicle	Head-on crashes:	11.9	0.0	0.2	1.2	5.5	4.9
	Right-angle crashes:	159.3	0.2	1.8	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 crashes:	62.0	0.2	0.6	3.9	15.2	42.1
	Total multiple-vehicle crashes:	2468.6	5.5	20.0	138.7	604.3	1700.0
Single vehicle	Crashes with animal:	8.9	0.0	0.0	0.2	0.6	8.1
	Crashes with fixed object:	508.9	2.1	6.1	37.7	128.7	334.4
	Crashes with other object:	61.3	0.1	0.3	2.0	7.7	51.1
	Crashes with parked vehicle:	9.9	0.0	0.1	0.7	2.5	6.5
	Other single-vehicle crashes	103.7	0.6	2.0	12.0	40.5	48.6
	Total single-vehicle crashes:	692.6	2.9	8.5	52.6	179.9	448.7
Total crashes:		3161.2	8.4	28.5	191.4	784.2	2148.7

Evaluation Site Summary

General Information

Project description:	I-495 MD From I-270 West Spur to MD 187_Phase 1 Build				
Analyst:	DK	Date:	1/31/22	Area type:	Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi):		1.710	
Last year of analysis:	2045				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
1	6	0.210	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
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 Segments

Number	Study Period Description	Number	Study Period Description
1	R0-1 Ramp from I-495 NB M	21	0
2	R0-2 Ramp from I-495 SB G	22	0
3	0	23	0
4	0	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

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
6	0	0	0

Output Summary

General Information

Project description:	I-495 MD From I-270 West Spur to MD 187_Phase 1 Build				
Analyst:	DK	Date:	4/7/2022	Area type:	Urban
First year of analysis:	2027				
Last year of analysis:	2045				

Crash Data Description

Freeway segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp terminals	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	

Estimated Crash Statistics

Crashes for Entire Facility	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:	1511.6	5.1	13.9	96.2	322.5	1073.9
Estimated average crash freq. during Study Period, crashes/yr:	79.6	0.3	0.7	5.1	17.0	56.5

Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	5	1481.4	4.8	13.1	92.3	316.2	1055.0
Ramp segments, crashes:	2	30.2	0.3	0.8	4.0	6.3	18.9
Crossroad ramp terminals, crashes:	0	0.0	0.0	0.0	0.0	0.0	0.0

Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	79.6	0.3	0.7	5.1	17.0	56.5
	2028	79.6	0.3	0.7	5.1	17.0	56.5
	2029	79.6	0.3	0.7	5.1	17.0	56.5
	2030	79.6	0.3	0.7	5.1	17.0	56.5
	2031	79.6	0.3	0.7	5.1	17.0	56.5
	2032	79.6	0.3	0.7	5.1	17.0	56.5
	2033	79.6	0.3	0.7	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	0.7	5.1	17.0	56.5
	2038	79.6	0.3	0.7	5.1	17.0	56.5
	2039	79.6	0.3	0.7	5.1	17.0	56.5
	2040	79.6	0.3	0.7	5.1	17.0	56.5
	2041	79.6	0.3	0.7	5.1	17.0	56.5
	2042	79.6	0.3	0.7	5.1	17.0	56.5
	2043	79.6	0.3	0.7	5.1	17.0	56.5
	2044	79.6	0.3	0.7	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 Crashes for Entire Facility

Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**C**	**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	0.3	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-vehicle crashes:	28.3	0.1	0.3	2.0	6.9	19.0
	Total multiple-vehicle crashes:	1121.1	3.6	9.7	68.3	233.4	806.0
Single vehicle	Crashes with animal:	6.1	0.0	0.0	0.1	0.3	5.7
	Crashes with fixed object:	285.0	1.1	3.0	20.2	64.4	196.4
	Crashes with other object:	40.9	0.1	0.2	1.4	4.6	34.7
	Crashes with parked vehicle:	4.9	0.0	0.1	0.4	1.1	3.4
	Other single-vehicle crashes	53.5	0.3	0.9	5.9	18.7	27.6
	Total single-vehicle crashes:	390.5	1.5	4.2	27.9	89.1	267.8
Total crashes:		1511.6	5.1	13.9	96.2	322.5	1073.9

Evaluation Site Summary

General Information

Project description:	I-495 MD From MD 187 To MD 355/I-495				
Analyst:	DK	Date:	1/31/22	Area type:	Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi):		1.450	
Last year of analysis:	2045				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
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 Segments

Number	Study Period Description	Number	Study Period Description
1	G2-1 Ramp from I-495 WB t	21	0
2	G4-2 Ramp from MD 187 NI	22	0
3	G6-3 Ramp from I-495 EB to	23	0
4	G8-4 Ramp from MD 187 to	24	0
5	G35.1-1 Ramp from MD 355	25	0
6	G35.6-2 Ramp from I-270 S	26	0
7	I-495 Outer Loop to I-270 NI	27	0
8	I-495 Outer Loop to I-270 NI	28	0
9	I-270 SB to I-495 Inner Loop	29	0
10	G1-5 MD 355 NB to I-495 O	30	0
11	G2-6 I-495 Outer Loop to M	31	0
12	G4-7 MD 355 NB to I-495 In	32	0
13	G5-8 MD 355 SB to I-495 In	33	0
14	G6-9.1 I-495 Inner Loop to M	34	0
15	G6-9.2 I-495 Inner Loop to M	35	0
16	0	36	0
17	0	37	0
18	0	38	0
19	0	39	0
20	0	40	0

Crossroad Ramp Terminals

Number	Config.	Control	Study Period Description
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

Output Summary

General Information

Project description:	I-495 MD From MD 187 To MD 355/I-495				
Analyst:	DK	Date:	1/31/22	Area type:	Urban
First year of analysis:	2027				
Last year of analysis:	2045				

Crash Data Description

Freeway segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp terminals	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	

Estimated Crash Statistics

Crashes for Entire Facility	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:	2964.8	8.5	39.6	243.4	920.3	1753.1
Estimated average crash freq. during Study Period, crashes/yr:	156.0	0.4	2.1	12.8	48.4	92.3

Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	9	1650.1	4.8	13.2	93.0	362.6	1176.6
Ramp segments, crashes:	15	287.3	3.0	9.1	47.1	89.9	138.2
Crossroad ramp terminals, crashes:	2	1027.5	0.7	17.3	103.3	467.9	438.3

Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	156.0	0.4	2.1	12.8	48.4	92.3
	2028	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
	2031	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
	2033	156.0	0.4	2.1	12.8	48.4	92.3
	2034	156.0	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						
	2049						
	2050						

Distribution of Crashes for Entire Facility

Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**C**	**PDO**
Multiple vehicle	Head-on crashes:	16.2	0.1	0.3	2.1	8.1	5.6
	Right-angle crashes:	278.5	0.3	4.8	29.2	130.1	114.2
	Rear-end crashes:	1642.5	4.4	22.3	138.4	541.9	935.4
	Sideswipe crashes:	452.9	0.9	3.3	21.1	77.9	349.6
	Other multiple-vehicle crashes:	68.3	0.4	1.2	7.2	20.9	38.6
	Total multiple-vehicle crashes:	2458.4	6.1	32.0	197.9	779.0	1443.4
Single vehicle	Crashes with animal:	5.3	0.0	0.0	0.1	0.3	4.8
	Crashes with fixed object:	369.2	1.7	5.3	32.1	98.8	231.4
	Crashes with other object:	43.9	0.1	0.3	1.7	5.9	35.9
	Crashes with parked vehicle:	7.5	0.0	0.1	0.6	2.0	4.8
	Other single-vehicle crashes	80.5	0.5	1.9	11.0	34.3	32.8
	Total single-vehicle crashes:	506.4	2.3	7.6	45.5	141.3	309.7
	Total crashes:	2964.8	8.5	39.6	243.4	920.3	1753.1

Evaluation Site Summary

General Information

Project description:	GWMP at I-495				
Analyst:	DK	Date:	1/31/22	Area type:	Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi):		0.230	
Last year of analysis:	2045				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
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	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 Segments

Number	Study Period Description		Number	Study Period Description
1	0		21	0
2	0		22	0
3	0		23	0
4	0		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

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
6	0	0	0

Output Summary

General Information

Project description:	GWMP at I-495				
Analyst:	DK	Date:	1/31/22	Area type:	Urban
First year of analysis:	2027				
Last year of analysis:	2045				

Crash Data Description

Freeway segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp terminals	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	

Estimated Crash Statistics

Crashes for Entire Facility	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:	57.1	0.5	0.9	6.7	11.7	37.3
Estimated average crash freq. during Study Period, crashes/yr:	3.0	0.0	0.0	0.4	0.6	2.0

Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	1	57.1	0.5	0.9	6.7	11.7	37.3
Ramp segments, crashes:	0	0.0	0.0	0.0	0.0	0.0	0.0
Crossroad ramp terminals, crashes:	0	0.0	0.0	0.0	0.0	0.0	0.0

Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	3.0	0.0	0.0	0.4	0.6	2.0
	2028	3.0	0.0	0.0	0.4	0.6	2.0
	2029	3.0	0.0	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	0.0	0.4	0.6	2.0
	2038	3.0	0.0	0.0	0.4	0.6	2.0
	2039	3.0	0.0	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	0.0	0.4	0.6	2.0
	2043	3.0	0.0	0.0	0.4	0.6	2.0
	2044	3.0	0.0	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 Crashes for Entire Facility

Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**C**	**PDO**
Multiple vehicle	Head-on crashes:	0.1	0.0	0.0	0.0	0.0	0.0
	Right-angle crashes:	0.8	0.0	0.0	0.1	0.2	0.4
	Rear-end crashes:	24.0	0.2	0.4	2.9	5.0	15.5
	Sideswipe crashes:	8.8	0.0	0.1	0.7	1.2	6.8
	Other multiple-vehicle crashes:	0.8	0.0	0.0	0.1	0.2	0.5
	Total multiple-vehicle crashes:	34.4	0.3	0.5	3.8	6.7	23.2
Single vehicle	Crashes with animal:	0.3	0.0	0.0	0.0	0.0	0.3
	Crashes with fixed object:	16.1	0.1	0.3	2.0	3.6	10.0
	Crashes with other object:	2.6	0.0	0.0	0.2	0.3	2.1
	Crashes with parked vehicle:	0.4	0.0	0.0	0.0	0.1	0.2
	Other single-vehicle crashes	3.3	0.0	0.1	0.6	1.1	1.4
	Total single-vehicle crashes:	22.6	0.2	0.4	2.9	5.0	14.1
	Total crashes:	57.1	0.5	0.9	6.7	11.7	37.3

Evaluation Site Summary

General Information

Project description:	From I-370 to Fields Road to Merge/Diverge From I-270 Ramps				
Analyst:	DK	Date:	1/31/22	Area type:	Urban
First year of analysis:	2027	Total length of freeway segments for Study Period (mi):		1.221	
Last year of analysis:	2045				

Site Description

Freeway Segments

Number	Lanes	Study Period Length (mi)	Study Period Description
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	0.000	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 Segments

Number	Study Period Description	Number	Study Period Description
1	Ramp from I-370 WB to Wa	21	0
2	Ramp from Washingtonian E	22	0
3	Ramp from Fields Rd/Sam E	23	0
4	Ramp from Washingtonian E	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
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

Crossroad Ramp Terminals

Number	Config.	Control	Study Period Description
1	D4	Signal	Washingtonian Blvd at I-370 WB
2	D4	Signal	Washingtonian Blvd at I-370 EB
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0

Output Summary

General Information

Project description:	From I-370 to Fields Road to Merge/Diverge From I-270 Ramps				
Analyst:	DK	Date:	1/31/22	Area type:	Urban
First year of analysis:	2027				
Last year of analysis:	2045				

Crash Data Description

Freeway segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp segments	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	
Ramp terminals	Segment crash data available?	No	First year of crash data:	
	Project-level crash data available?	No	Last year of crash data:	

Estimated Crash Statistics

Crashes for Entire Facility	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during Study Period, crashes:	477.3	2.5	7.8	45.6	108.1	313.2
Estimated average crash freq. during Study Period, crashes/yr:	25.1	0.1	0.4	2.4	5.7	16.5

Crashes by Facility Component	**Nbr. Sites**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Freeway segments, crashes:	13	322.8	2.2	5.8	34.2	67.8	212.9
Ramp segments, crashes:	6	31.8	0.3	0.8	4.1	6.9	19.8
Crossroad ramp terminals, crashes:	2	122.6	0.0	1.2	7.4	33.4	80.6

Crashes for Entire Facility by Year	**Year**	**Total**	**K**	**A**	**B**	**C**	**PDO**
Estimated number of crashes during the Study Period, crashes:	2027	25.1	0.1	0.4	2.4	5.7	16.5
	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	25.1	0.1	0.4	2.4	5.7	16.5
	2042	25.1	0.1	0.4	2.4	5.7	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 Crashes for Entire Facility

Crash Type	**Crash Type Category**	**Estimated Number of Crashes During the Study Period**					
		Total	**K**	**A**	**B**	**C**	**PDO**
Multiple vehicle	Head-on crashes:	1.9	0.0	0.0	0.2	0.7	0.9
	Right-angle crashes:	33.0	0.0	0.4	2.5	9.8	20.3
	Rear-end crashes:	227.1	1.1	3.6	20.9	54.1	147.6
	Sideswipe crashes:	67.1	0.3	0.7	4.4	9.7	52.1
	Other multiple-vehicle crashes:	8.4	0.0	0.1	0.8	1.7	5.7
	Total multiple-vehicle crashes:	337.6	1.5	4.9	28.7	75.9	226.7
Single vehicle	Crashes with animal:	1.7	0.0	0.0	0.0	0.1	1.6
	Crashes with fixed object:	102.0	0.8	2.1	12.1	22.9	64.1
	Crashes with other object:	13.3	0.1	0.1	0.8	1.6	10.8
	Crashes with parked vehicle:	1.9	0.0	0.0	0.2	0.4	1.2
	Other single-vehicle crashes	20.8	0.2	0.7	3.8	7.2	8.9
	Total single-vehicle crashes:	139.7	1.1	2.9	17.0	32.2	86.5
	Total crashes:	477.3	2.5	7.8	45.6	108.1	313.2

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.

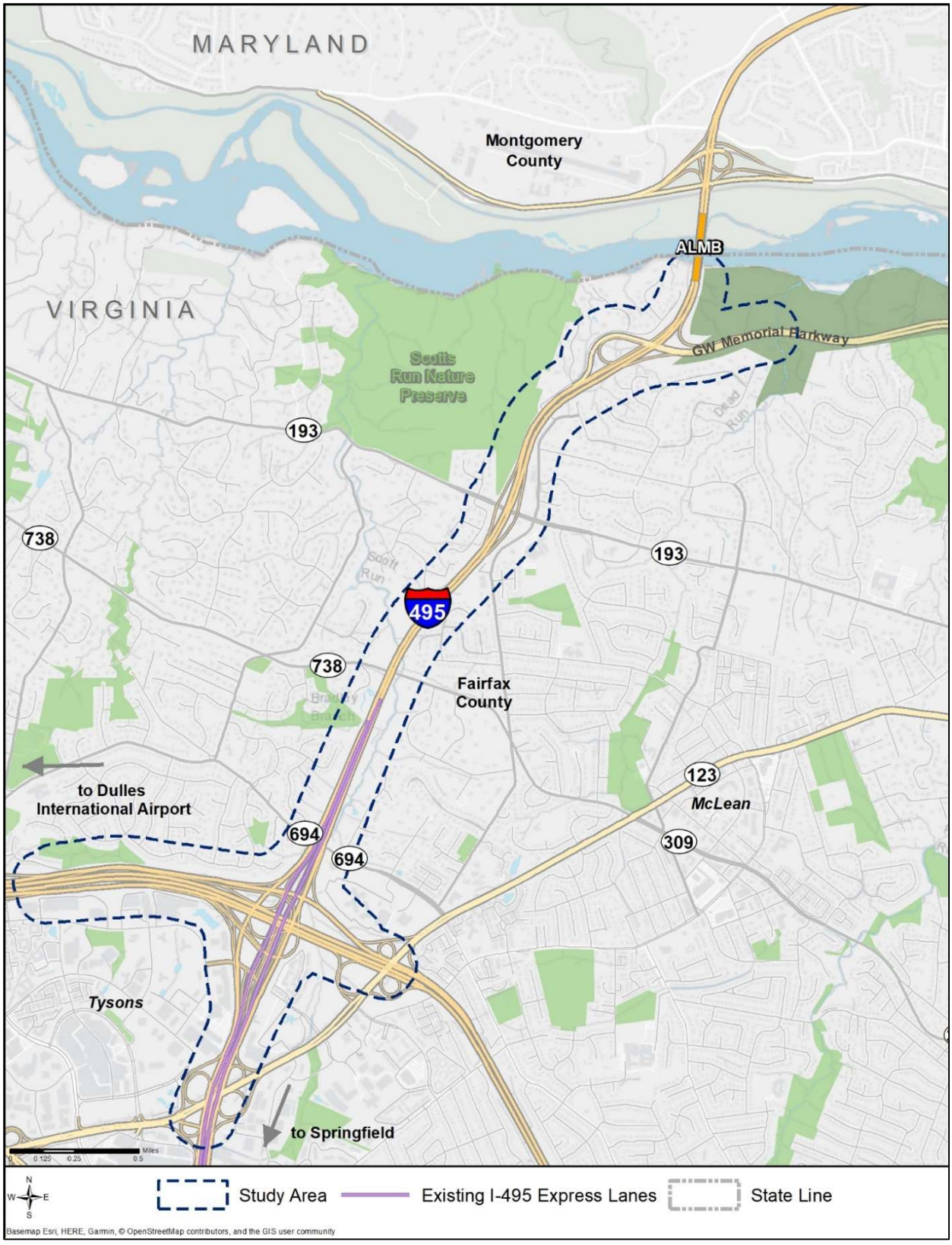
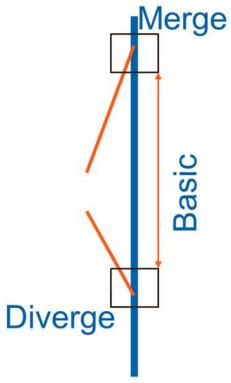


Figure 1: Express Lanes Northern Extension Study Area

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:

<u>For Northbound Express Lanes segments</u>:

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

8. 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:

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

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 * ln($AADT_{i,t}$)

Linear Regression: Expectation ($Crashes_{i,t}$) = 0.550840245 + 4.130999289 * $Segment\ Length_{i,t}$) - 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:

$Crashes_{i,t}$ = 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

ID	Segment	Year	Length (miles)	AADT	Crashes	Non-Linear Predicted Crashes	Linear Predicted Crashes
NB Express Lanes – BS & WS Segments							
1	BS - From the Southern NB Entrance to the on-ramp from Braddock Road	2013	2.27	7966	24.0	8.1	9.0
2	BS - From the on-ramp from Braddock Rd to the on-ramp from Gallows Road	2013	2.61	9481	9.0	9.5	10.2
3	BS - From the on-ramp from Gallows Road to the off-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
5	BS - From the off-ramp to I-66 to the on-ramp from I-66 EB	2013	0.88	7671	0.0	3.2	3.3
6	BS - From the on-ramp from I-66 EB to the off-ramp to Leesburg Pike (VA Rt 7)	2013	0.61	10782	2.0	2.3	1.8
7	BS - From the off-ramp to Leesburg Pike (VA Rt 7) to the off-ramp to Westpark Drive Connector	2013	0.63	9320	2.0	2.3	2.0
8	BS - From the off-ramp to Westpark Drive Connector to the on-ramp from Westpark Drive Connector	2013	0.5	8072	0.0	1.8	1.6
9	WS - From the on-ramp from Westpark Drive Connector to the off-ramp to Jones Branch Connector	2013	0.18	8964	0.0	0.7	0.2
11	BS - From the off-ramp to VA Rt 267 to the on-ramp from Jones Branch Connector	2013	0.28	926	0.0	0.8	1.6
12	BS - From on-ramp from Jones Branch Connector to 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
1	BS - From the Southern NB Entrance to the on-ramp from 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						
3	BS - From the on-ramp from Gallows Road to the off-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
5	BS - From the off-ramp to I-66 to the on-ramp from I-66 EB	2014	0.88	9015	2.0	3.2	3.1
6	BS - From the on-ramp from I-66 EB to the off-ramp to Leesburg Pike (VA Rt 7)	2014	0.61	12655	0.0	2.4	1.5
7	BS - From the off-ramp to Leesburg Pike (VA Rt 7) to the off-ramp to Westpark Drive Connector	2014	0.63	10853	2.0	2.4	1.8
8	BS - From the off-ramp to Westpark Drive Connector to the on-ramp from Westpark Drive Connector	2014	0.5	9373	5.0	1.9	1.5
9	WS - From the on-ramp from Westpark Drive Connector to the off-ramp to Jones Branch Connector	2014	0.18	10663	0.0	0.7	0.0
11	BS - From the off-ramp to VA Rt 267 to the on-ramp from Jones Branch Connector	2014	0.28	1255	0.0	0.8	1.6
12	BS - From on-ramp from Jones Branch Connector to 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
1	BS - From the Southern NB Entrance to the on-ramp from Braddock Road	2015	2.27	10783	9.0	8.4	8.6
2	BS - From the on-ramp from Braddock Rd to the on-ramp from Gallows Road	2015	2.61	12714	3.0	9.9	9.8
3	BS - From the on-ramp from Gallows Road to the off-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
5	BS - From the off-ramp to I-66 to the on-ramp from I-66 EB	2015	0.88	10041	1.0	3.3	3.0
6	BS - From the on-ramp from I-66 EB to the off-ramp to Leesburg Pike (VA Rt 7)	2015	0.61	13982	0.0	2.4	1.4
7	BS - From the off-ramp to Leesburg Pike (VA Rt 7) to the 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						
9	WS - From the on-ramp from Westpark Drive Connector to the off-ramp to Jones Branch Connector	2015	0.18	11962	0.0	0.7	0.0
11	BS - From the off-ramp to VA Rt 267 to the on-ramp from Jones Branch Connector	2015	0.28	1529	0.0	0.8	1.5
12	BS - From on-ramp from Jones Branch Connector to 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
1	BS - From the Southern NB Entrance to the on-ramp from Braddock Road	2016	2.27	11547	10.0	8.5	8.5
2	BS - From the on-ramp from Braddock Rd to the on-ramp from Gallows Road	2016	2.61	13560	6.0	10.0	9.7
3	BS - From the on-ramp from Gallows Road to the off-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
5	BS - From the off-ramp to I-66 to the on-ramp from I-66 EB	2016	0.88	10412	3.0	3.3	2.9
6	BS - From the on-ramp from I-66 EB to the off-ramp to Leesburg Pike (VA Rt 7)	2016	0.61	14623	0.0	2.4	1.3
7	BS - From the off-ramp to Leesburg Pike (VA Rt 7) to the off-ramp to Westpark Drive Connector	2016	0.63	12511	0.0	2.4	1.6
8	BS - From the off-ramp to Westpark Drive Connector to the on-ramp from Westpark Drive Connector	2016	0.5	10891	2.0	1.9	1.3
9	WS - From the on-ramp from Westpark Drive Connector to the off-ramp to Jones Branch Connector	2016	0.18	12507	0.0	0.7	0.0
11	BS - From the off-ramp to VA Rt 267 to the on-ramp from Jones Branch Connector	2016	0.28	1625	0.0	0.8	1.5
12	BS - From on-ramp from Jones Branch Connector to 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
1	BS - From the Southern NB Entrance to the on-ramp from 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						
3	BS - From the on-ramp from Gallows Road to the off-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
5	BS - From the off-ramp to I-66 to the on-ramp from I-66 EB	2017	0.88	11028	3.0	3.3	2.8
6	BS - From the on-ramp from I-66 EB to the off-ramp to Leesburg Pike (VA Rt 7)	2017	0.61	15686	0.0	2.4	1.2
7	BS - From the off-ramp to Leesburg Pike (VA Rt 7) to the off-ramp to Westpark Drive Connector	2017	0.63	13505	0.0	2.5	1.5
8	BS - From the off-ramp to Westpark Drive Connector to the on-ramp from Westpark Drive Connector	2017	0.5	11793	1.0	1.9	1.2
9	WS - From the on-ramp from Westpark Drive Connector to the off-ramp to Jones Branch Connector	2017	0.18	13720	0.0	0.7	0.0
11	BS - From the off-ramp to VA Rt 267 to the on-ramp from Jones Branch Connector	2017	0.28	1767	0.0	0.8	1.5
12	BS - From on-ramp from Jones Branch Connector to 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 Express Lanes – BS & WS Segments							
24	BS - From Northern SB Entrance to the off-ramp to VA Rt 267	2013	0.15	4565	1.0	0.5	0.6
26	BS - From the off-ramp to VA Rt 267 to off-ramp to Jones Branch Connector	2013	0.21	3730	0.0	0.7	1.0
28	BS - From the off-ramp to Jones Branch Connector to the on-ramp from Jones Branch Connector	2013	0.35	8345	1.0	1.3	1.0
32	WS - From the on-ramp from VA Rt 267 to the off-ramp to Westpark Drive Connector	2013	0.17	6216	1.0	0.6	0.5
34	BS - From the off-ramp to Westpark Drive Connector to the on-ramp from Westpark Drive Connector	2013	0.45	8072	2.0	1.6	1.4
36	BS - From the on-ramp from Westpark Drive Connector to 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						
40	BS - From the off-ramp from I-66 WB to the on-ramp from I-66 WB & EB	2013	0.41	6577	2.0	1.5	1.4
42	BS - From the on-ramp from I-66 WB and EB to the on-ramp from Lee Highway	2013	0.75	7755	6.0	2.7	2.7
44	BS - From the on-ramp from Lee Highway to the off-ramp to Gallows Road	2013	0.56	8732	0.0	2.1	1.8
46	BS - From the off-ramp to Gallows Road to the off-ramp to Braddock Road	2013	2.6	7353	20.0	9.1	10.4
48	BS - From the off-ramp to Braddock Road to the Southern SB Exit	2013	1.39	5861	10.0	4.8	5.6
	SubTotal BS&WS crashes	2013			56.0	29.3	30.7
24	BS - From Northern SB Entrance to the off-ramp to VA Rt 267	2014	0.15	5300	1.0	0.5	0.5
26	BS - From the off-ramp to VA Rt 267 to off-ramp to Jones Branch Connector	2014	0.21	4368	1.0	0.7	0.9
28	BS - From the off-ramp to Jones Branch Connector to the on-ramp from Jones Branch Connector	2014	0.35	10064	0.0	1.3	0.8
32	WS - From the on-ramp from VA Rt 267 to the off-ramp to Westpark Drive Connector	2014	0.17	7268	0.0	0.6	0.4
34	BS - From the off-ramp to Westpark Drive Connector to the on-ramp from Westpark Drive Connector	2014	0.45	9373	0.0	1.7	1.3
36	BS - From the on-ramp from Westpark Drive Connector to the on-ramp from Leesburg Pike (VA Rt 7)	2014	0.7	8646	3.0	2.6	2.4
38	BS - From the on-ramp from Leesburg Pike (VA Rt 7) to the off-ramp from I-66 WB	2014	0.53	9862	4.0	2.0	1.5
40	BS - From the off-ramp from I-66 WB to the on-ramp from I-66 WB & EB	2014	0.41	7806	1.0	1.5	1.3
42	BS - From the on-ramp from I-66 WB and EB to the on-ramp from Lee Highway	2014	0.75	9253	4.0	2.8	2.5
44	BS - From the on-ramp from Lee Highway to the off-ramp to Gallows Road	2014	0.56	10594	1.0	2.1	1.6
46	BS - From the off-ramp to Gallows Road to the off-ramp to Braddock Road	2014	2.6	8972	7.0	9.4	10.2

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

32	WS - From the on-ramp from VA Rt 267 to the off-ramp to Westpark Drive Connector	2016	0.17	9974	0.0	0.6	0.0
34	BS - From the off-ramp to Westpark Drive Connector to the on-ramp from Westpark Drive Connector	2016	0.45	10891	0.0	1.7	1.1
36	BS - From the on-ramp from Westpark Drive Connector to the on-ramp from Leesburg Pike (VA Rt 7)	2016	0.7	11851	2.0	2.7	2.0
38	BS - From the on-ramp from Leesburg Pike (VA Rt 7) to the off-ramp from I-66 WB	2016	0.53	13566	1.0	2.1	1.1
40	BS - From the off-ramp from I-66 WB to the on-ramp from I-66 WB & EB	2016	0.41	10685	1.0	1.6	0.9
42	BS - From the on-ramp from I-66 WB and EB to the on-ramp from Lee Highway	2016	0.75	12820	6.0	2.9	2.1
44	BS - From the on-ramp from Lee Highway to the off-ramp to Gallows Road	2016	0.56	14704	0.0	2.2	1.1
46	BS - From the off-ramp to Gallows Road to the off-ramp to Braddock Road	2016	2.6	12473	4.0	9.8	9.8
48	BS - From the off-ramp to Braddock Road to the Southern SB Exit	2016	1.39	10387	6.0	5.2	5.0
	SubTotal BS&WS crashes	2016			21.0	31.4	24.7
24	BS - From Northern SB Entrance to the off-ramp to VA Rt 267	2017	0.15	8446	0.0	0.6	0.1
26	BS - From the off-ramp to VA Rt 267 to off-ramp to Jones Branch Connector	2017	0.21	7177	0.0	0.8	0.5
28	BS - From the off-ramp to Jones Branch Connector to the on-ramp from Jones Branch Connector	2017	0.35	13103	0.0	1.4	0.4
32	WS - From the on-ramp from VA Rt 267 to the off-ramp to Westpark Drive Connector	2017	0.17	11196	2.0	0.7	0.0
34	BS - From the off-ramp to Westpark Drive Connector to the on-ramp from Westpark Drive Connector	2017	0.45	11793	0.0	1.7	1.0
36	BS - From the on-ramp from Westpark Drive Connector to the on-ramp from Leesburg Pike (VA Rt 7)	2017	0.7	13374	2.0	2.7	1.8
38	BS - From the on-ramp from Leesburg Pike (VA Rt 7) to the off-ramp from I-66 WB	2017	0.53	15226	1.0	2.1	0.9
40	BS - From the off-ramp from I-66 WB to the on-ramp from	2017	0.41	11907	0.0	1.6	0.8

	I-66 WB & EB						
42	BS - From the on-ramp from I-66 WB and EB to the on-ramp from Lee Highway	2017	0.75	14311	1.0	2.9	1.9
44	BS - From the on-ramp from Lee Highway to the off-ramp to Gallows Road	2017	0.56	16408	0.0	2.2	0.9
46	BS - From the off-ramp to Gallows Road to the off-ramp to Braddock Road	2017	2.6	13992	8.0	10.0	9.6
48	BS - From the off-ramp to Braddock Road to the Southern SB Exit	2017	1.39	11816	6.0	5.3	4.9
	SubTotal BS&WS crashes	2017			20.0	31.9	22.8
NB Express Lanes – MS Segments							
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
SB Express 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 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 Statistics						
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 Statistics						
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	0.231211878	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 Statistics						
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 Statistics						
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	49.64444444				
	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 Statistics						
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 Statistics						
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 Statistics						
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 Statistics						
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 Statistics						
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	49.64444444				
	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 Statistics								
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%*	*pper 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

#	Interchange	Segment Number and Description		L (ft)	L (mi)	n	ADT	AADT	Fatal and Injury	PDO	Total
1	Southern Study Limit to GWMP	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
		BS	SB ML MP 0.79 - MP 0.00	4163	0.79	2	17105	16592	0.85	2.30	3.16
		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

#	Interchange	Segment Number and Description		L (ft)	L (mi)	n	ADT	AADT	Fatal and Injury	PDO	Total
1	Southern Study Limit to GWMP	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
		BS	NB ML MP 14.59 - 15.02	2245	0.43	2	17700	17169	0.47	1.26	1.72
		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
				Subtotal	**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

#	Interchange	Segment Number and Description		L (ft)	L (mi)	n	ADT	AADT	Fatal and Injury	PDO	Total
	GWMP to Maryland State Line	MS	NB ML MP 15.37 - 15.39	124	0.02	3	25095	16229	0.03	0.07	0.10
		BS	SB ML MP 15.39 - 15.25	741	0.14	2	29360	28480	0.17	0.45	0.62
		BS	SB ML MP 15.25 - 15.23	118	0.02	3	29360	18987	0.03	0.07	0.10
		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

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

#	Interchange	Segment Number and Description		L (ft)	L (mi)	n	ADT	AADT	Fatal and 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
			Subtotal		3.76				**4.29**	**11.59**	**15.88**
3	**MD 190 (River Road) / Cabin John Parkway to I-495/ I-270 Split**	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
		BS	NB ML MP 2.60 - MP 3.25	3421	0.65	3	30195	19527	0.72	1.94	2.66
		DS	NB ML MP 3.25 - MP 3.34	500	0.09	3	30195	19527	0.11	0.29	0.40
		MS	SB ML MP 3.55 - MP 3.46	500	0.09	3	34650	22407	0.11	0.30	0.41
		BS	SB ML MP 3.46 - MP 2.70	4015	0.76	3	34650	22407	0.86	2.32	3.18
		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
		DS	SB ML MP 2.37 - MP 2.35	112	0.02	3	30165	19507	0.02	0.07	0.09
			Subtotal		**2.31**				**2.58**	**6.98**	**9.56**
			Total		**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

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

#	Interchange	Segment Number and Description		L (ft)	L (mi)	n	ADT	AADT	Fatal and 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
				Subtotal	**1.52**				**1.75**	**4.72**	**6.47**
6	**Wootton Parkway to MD 189**	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
		BS	NB ML MP 5.20 - MP 5.49	1525	0.29	2	31660	30711	0.34	0.93	1.28
		BS	SB ML MP 5.50 - MP 5.25	1405	0.27	2	26990	26181	0.31	0.84	1.15
		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
				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
		BS	SB ML MP 6.47 - MP 5.50	5144	0.97	2	26990	26181	1.12	3.03	4.15
				Subtotal	**1.95**				**2.26**	**6.12**	**8.38**
8	**MD 28 to W. Gude Drive**	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
		DS	NB ML MP 7.22 - MP 7.29	355	0.07	3	31660	20474	0.08	0.21	0.29
		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

#	Interchange	Segment Number and Description		L (ft)	L (mi)	n	ADT	AADT	Fatal and 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
				Subtotal	**2.19**				**2.51**	**6.78**	**9.29**
9	**W. Gude Drive to Shady Grove Road**	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
		BS	NB ML MP 7.92 - MP 8.37	2370	0.45	2	23305	22606	0.51	1.38	1.89
		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
				Subtotal	**1.61**				**1.81**	**4.89**	**6.70**
	Shady Grove Road to I-370	BS	NB ML MP 8.37 - MP 8.62	1316	0.25	2	23305	22606	0.29	0.77	1.06
		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
				Subtotal	**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

#	Interchange	Segment Number and Description		L (ft)	L (mi)	n	ADT	AADT	Fatal and Injury	PDO	Total
1	I-495/ I-270 West Spur Split to Democracy Boulevard	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
		BS	NB ML MP 1.20 - MP 1.21	57	0.01	2	19585	18998	0.01	0.03	0.05
		MS	SB ML MP 1.21 - MP 1.12	472	0.09	3	12940	8368	0.09	0.24	0.33
		BS	SB ML MP 1.12 - MP 1.07	290	0.05	3	12940	8368	0.06	0.15	0.21
		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
			Subtotal		**2.31**				**1.36**	**3.67**	**5.03**
2	Democracy Boulevard to Westlake Terrace	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
		BS	NB ML MP 1.34 - MP 1.55	1101	0.21	3	23025	14890	0.23	0.61	0.84
		BS	SB ML MP 1.55 - 1.45	510	0.10	2	19500	18915	0.11	0.30	0.40
		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
			Subtotal		**0.69**				**0.75**	**2.02**	**2.77**
3	Westlake Terrace to I-270	BS	NB ML MP 1.55 - MP 1.59	229	0.04	3	23025	14890	0.05	0.13	0.18
		DS	NB ML MP 1.59 - MP 1.68	500	0.09	3	23025	14890	0.10	0.28	0.38
		BS	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
	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,

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

	Terminal 1	Terminal 2
$AADT_{xrd}$ (AADT on the crossroad, veh/day)	29290	30221
$AADT_{ex}$	10617	10282
$AADT_{en}$	11223	9875
Number of Cross Road Through Lanes	4	4

Crash Severity	a	b	c	d
FI Crashes	-2.335	1.191	0.001	0.131
PDO Crashes	-2.072	0.879	0.001	0.545

$N_{spf} = exp[a + b * ln (c * AADT_{xrd}) + d * ln(c * AADT_{ex} + c * AADT_{en})]$	Terminal 1	Terminal 2	Total
N_{spf} (predicted average crash frequency, crashes/year)	21.26	21.26	**42.52**
$N_{spf,FI}$ (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**

Table 19-15. SPF Coefficients for Crashes at Signalized Ramp Terminals—Four-Leg Terminal with Diagonal Ramps (*D4*)

Crash Severity (*z*)	Area Type	Number of Crossroad Through Lanes (*n*)	SPF Coefficient *a*	*b*	*c*	*d*	Inverse Dispersion Parameter $K_{w,SG_n,at,z}$
Fatal and injury (*fi*)	Rural or urban	2	−2.655	1.191	0.001	0.131	11.5
		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 damage only (*pdo*)	Rural or urban	2	−2.248	0.879	0.001	0.545	7.21
		3	−2.160	0.879	0.001	0.545	7.21
		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

Terminal 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 EB

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

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

$AADT_{xrd}$ (AADT on the crossroad, veh/day)	30575
$AADT_{ramp}$ (sum of ramp AADTs, veh/day)	41997
exit_free_right (number of exit ramps with free-flow right turns)	0

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

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

N_{spf} (predicted average crash frequency, crashes/year)	27.47		**27.47**
$N_{spf,FI}$ (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)

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

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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	a	b	c	d
FI Crashes	-2.335	1.191	0.001	0.131
PDO Crashes	-2.072	0.879	0.001	0.545

Predicted 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
$N_{spf,FI}$ (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

$N_{pred} = N_{SPF} \cdot C_i \cdot CMF_j$

	Terminal 1		Terminal 2		Total	
	FI	PDO	FI	PDO	FI	PDO
N_{SPF} – predicted crash frequency for D4 ramp terminal SPF (crashes/year)	8.02	12.67	8.63	12.74		
C_i – Local calibration factor for ramp terminal SPF	1	1	1	1		
CMF_j – crash modification factor for D4 to DDI	0.558	0.92	0.558	0.92		
CMFk – crash modification factor for D4 to SPUI	0.389	0.808	0.389	0.808		
CMFl - crash modification factor for SPUI to DDI	1.435	1.139	1.435	1.139		
N_{pred} – predicted crash frequency (crashes/year) for DDI	4.48	11.65	4.81	11.72		

D4 to DDI CMF	FI	PDO
CMF	0.558	0.92
CMF ID	10762	10763
Star Rating	****	****

2045 Build ADT Volumes

Terminal 1				*Terminal 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 Ramps (*D4*)

Crash Severity (*z*)	Area Type	Number of Crossroad Through Lanes (*n*)	SPF Coefficient *a*	*b*	*c*	*d*	Inverse Dispersion Parameter $K_{w, SGn, at, z}$
Fatal and injury (*fi*)	Rural or urban	2	–2.655	1.191	0.001	0.131	11.5
		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 damage only (*pdo*)	Rural or urban	2	–2.248	0.879	0.001	0.545	7.21
		3	–2.160	0.879	0.001	0.545	7.21
		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

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections						
General Information				**Location Information**		
Analyst	PC			Roadway	Rockledge Drive	
Agency or Company	ATCS			Intersection	Rockledge Dr at Rock Forest Dr	
Date Performed	02/18/21			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)	--	25,464	
AADT $_{minor}$ (veh/day)	$AADT_{MAX}$ =	33,400	(veh/day)	--	9,600	
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 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	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	
Number of approaches with right-turn-on-red 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 (PedVol) -- Signalized intersections only					424	
Maximum number of lanes crossed by a pedestrian (n_{lanesx})				--	6	
Number of bus stops within 300 m (1,000 ft) of the intersection				0	3	
Schools within 300 m (1,000 ft) of the intersection (present/not present)				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	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	7.201	1.000	7.201	0.46	1.00	3.316
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	2.336	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.336	2.421	0.46	1.00	1.115
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	4.612	$(5)_{TOTAL}-(5)_{FI}$ = 0.664	4.780	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)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.251	0.109	0.46	1.00	0.050
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.322	$(5)_{TOTAL}-(5)_{FI}$ = 0.749	0.325	0.46	1.00	0.150

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	0.150	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}**
	(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 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}	
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 factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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}**
	(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)	--	--	--	--	0.053

* 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)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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 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 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections						
General 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 Connect	
Date Performed	02/18/21			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)	--	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 right-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 (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-red prohibited [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) -- Signalized intersections only					3	
Maximum number of lanes crossed by a pedestrian (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 intersection (present/not present)				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)
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	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-12.13	1.11	0.26	0.33	4.712	1.000	4.712	0.82	1.00	3.876
Fatal and Injury (FI)	-11.58	1.02	0.17	0.30	1.400	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.313	1.474	0.82	1.00	1.213
Property Damage Only (PDO)	-13.24	1.14	0.30	0.36	3.074	$(5)_{TOTAL}-(5)_{FI}$ 0.687	3.238	0.82	1.00	2.663

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	1.213	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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-9.02	0.42	0.40	0.36	0.376	1.000	0.376	0.82	1.00	0.309
Fatal and Injury (FI)	-9.75	0.27	0.51	0.24	0.113	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.315	0.118	0.82	1.00	0.097
Property Damage Only (PDO)	-9.08	0.45	0.33	0.53	0.246	$(5)_{TOTAL}-(5)_{FI}$ 0.685	0.257	0.82	1.00	0.212

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	0.097	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	--	--	--	--	--
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 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}	
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 Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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}**
	(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

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; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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 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)	1.4
Property damage only (PDO)	2.9

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections						
General Information					**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)				--	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 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	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 applicable)				--	Not Applicable	
Number of approaches with right-turn-on-red 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 (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 intersection				0	0	
Schools within 300 m (1,000 ft) of the intersection (present/not present)				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)
0.86	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	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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 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	1.158	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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.325	0.143	0.69	1.00	0.099
Property Damage Only (PDO)	-9.08	0.45	0.33	0.53	0.283	$(5)_{TOTAL}-(5)_{FI}$ = 0.675	0.298	0.69	1.00	0.206

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	0.099	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 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}	
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 Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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}**
	(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

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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 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)	2.9

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections						
General Information				**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	
Input 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-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 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 applicable)				--	Permissive	
Number of approaches with right-turn-on-red 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 (PedVol) -- Signalized intersections only					108	
Maximum number of lanes crossed by a pedestrian (n_{lanesx})				--	7	
Number of bus stops within 300 m (1,000 ft) of the intersection				0	4	
Schools within 300 m (1,000 ft) of the intersection (present/not present)				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 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)
0.81	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 Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	15.403	1.000	15.403	0.68	1.00	10.466
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	5.457	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.366	5.634	0.68	1.00	3.828
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	9.462	$(5)_{TOTAL}-(5)_{FI}$ 0.634	9.769	0.68	1.00	6.638

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	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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.202	0.137	0.68	1.00	0.093
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.546	$(5)_{TOTAL}-(5)_{FI}$ 0.798	0.541	0.68	1.00	0.368

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	0.093	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}**
	(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 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}	
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 Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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)	--	--	--	--	--	--	--	--	1.00	0.179

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	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

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; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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 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	11.3
Fatal and injury (FI)	4.3
Property damage only (PDO)	7.0

Worksheet 1A -- General Information and Input Data for Urban and Suburban 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 Present, 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 Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.262	0.152	1.61	1.00	0.245
Property Damage Only (PDO)	-12.81	1.38	1.34	0.452	$(5)_{TOTAL}-(5)_{FI}$ = 0.738	0.429	1.61	1.00	0.693

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	0.245	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)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.200	0.011	1.61	1.00	0.017
Property Damage Only (PDO)	-5.04	0.45	1.06	0.043	$(5)_{TOTAL}-(5)_{FI}$ = 0.800	0.043	1.61	1.00	0.069

Worksheet 1F -- Single-Vehicle 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 $_{brsv\ (FI)}$ (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

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		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	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)	(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_r**	**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	1.61	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)*
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	0.938	0.086	0.072	1.095	0.019	0.021
Fatal 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)*
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	0.938	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

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (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
Driveway-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

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 Urban and Suburban Arterial Intersections						
General 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	
Input 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 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	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 applicable)				--	Not Applicable	
Number of approaches with right-turn-on-red 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 (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 intersection				0	0	
Schools within 300 m (1,000 ft) of the intersection (present/not present)				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)
0.93	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	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-12.13	1.11	0.26	0.33	10.124	1.000	10.124	0.77	1.00	7.823
Fatal and Injury (FI)	-11.58	1.02	0.17	0.30	2.917	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.305	3.090	0.77	1.00	2.388
Property Damage Only (PDO)	-13.24	1.14	0.30	0.36	6.642	$(5)_{TOTAL}-(5)_{FI}$ = 0.695	7.034	0.77	1.00	5.436

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	2.388	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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.268	0.117	0.77	1.00	0.091
Property Damage Only (PDO)	-9.08	0.45	0.33	0.53	0.303	$(5)_{TOTAL}-(5)_{FI}$ = 0.732	0.320	0.77	1.00	0.247

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	0.091	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}**
	(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 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}	
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 Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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}**
	(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

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; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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 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 Information and Input Data for Urban and Suburban 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 Present, 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 Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-12.34	1.36	1.32	1.534	1.000	1.534	1.18	1.00	1.813
Fatal and Injury (FI)	-12.76	1.28	1.31	0.438	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.271	0.415	1.18	1.00	0.491
Property Damage Only (PDO)	-12.81	1.38	1.34	1.180	$(5)_{TOTAL}-(5)_{FI}$ = 0.729	1.118	1.18	1.00	1.322

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	0.491	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)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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

Worksheet 1F -- Single-Vehicle 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 $_{brsv\ (FI)}$ (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	0.206	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

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		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	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_r**	**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)	--	0.284	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)
Total	1.813	0.252	0.000	2.066	0.019	0.039
Fatal 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

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (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

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections						
General 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	
				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)	--	27,538	
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 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 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 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 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 intersection				0	2	
Schools within 300 m (1,000 ft) of the intersection (present/not present)				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)
0.81	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 Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	7.780	1.000	7.780	0.63	1.00	4.873
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	2.546	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.339	2.639	0.63	1.00	1.653
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	4.962	$(5)_{TOTAL}-(5)_{FI}$ 0.661	5.141	0.63	1.00	3.220

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	1.653	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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.246	0.111	0.63	1.00	0.070
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.339	$(5)_{TOTAL}-(5)_{FI}$ 0.754	0.342	0.63	1.00	0.214

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	0.070	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)	(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 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}	
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 Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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)	(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	4.873	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

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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 Information and Input Data for Urban and Suburban 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	06/08/20	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 Present, 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 Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-12.40	1.41	0.66	2.540	1.000	2.540	1.16	1.00	2.958
Fatal and Injury (FI)	-16.45	1.69	0.59	0.769	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.304	0.772	1.16	1.00	0.899
Property Damage Only (PDO)	-11.95	1.33	0.59	1.761	$(5)_{TOTAL}-(5)_{FI}$ = 0.696	1.767	1.16	1.00	2.059

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	0.899	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)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.269	0.075	1.16	1.00	0.087
Property Damage Only (PDO)	-6.29	0.56	1.93	0.196	$(5)_{TOTAL}-(5)_{FI}$ = 0.731	0.203	1.16	1.00	0.236

Worksheet 1F -- Single-Vehicle 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 $_{brsv\ (FI)}$ (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	0.087	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

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		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	0.102	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)	(7)
Crash Severity Level	**Initial N_{brdwy}**	**Proportion of total crashes (f_{dwy})**	**Adjusted N_{brdwy}**	**Combined CMFs**	**Calibration factor, C_r**	**Predicted N_{brdwy}**
	$(5)_{TOTAL}$ 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
Fatal 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

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)** (3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	**Property damage only (PDO)** (5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	**Total** (6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (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
Driveway-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
Total	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

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections						
General Information				**Location Information**		
Analyst	ST			Roadway	MD 28	
Agency or Company	ATCS			Intersection	MD 28 at Laird St.	
Date Performed	06/08/20			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)	--	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 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	2	
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				--	Permissive	
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-red 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 (PedVol) -- Signalized intersections only					240	
Maximum number of lanes crossed by a pedestrian (n_{lanesx})				--	3	
Number of bus stops within 300 m (1,000 ft) of the intersection				0	4	
Schools within 300 m (1,000 ft) of the intersection (present/not present)				Not Present	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)
0.81	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	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	5.020	1.000	5.020	0.71	1.00	3.555
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	1.679	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.349	1.751	0.71	1.00	1.240
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	3.135	$(5)_{TOTAL}-(5)_{FI}$ 0.651	3.269	0.71	1.00	2.315

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	1.240	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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.230	0.062	0.71	1.00	0.044
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.209	$(5)_{TOTAL}-(5)_{FI}$ 0.770	0.207	0.71	1.00	0.146

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	0.044	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)	(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 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}	
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)
Crash Severity Level	**SPF Coefficients**					**Overdispersion Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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}**
	(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

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; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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 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)	2.5

Worksheet 1A -- General Information and Input Data for Urban and Suburban 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	02/16/21	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 Present, 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)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.284	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	0.871

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	0.345	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)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.214	0.034	1.18	1.00	0.040
Property Damage Only (PDO)	-8.50	0.84	0.97	0.133	$(5)_{TOTAL}-(5)_{FI}$ = 0.786	0.126	1.18	1.00	0.149

Worksheet 1F -- Single-Vehicle 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 $_{brsv\ (FI)}$ (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

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		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	0.182	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_r**	**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)*
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	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

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)** (3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	**Property damage only (PDO)** (5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	**Total** (6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (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
Driveway-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
Total	0.401	1.020	1.421

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)** (Total) from Worksheet 1K	**Roadway segment length, L (mi)**	**Crash rate (crashes/mi/year)** (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 Urban and Suburban Arterial Intersections						
General Information				**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	
Input Data				**Base Conditions**	**Site Conditions**	
Intersection type (3ST, 3SG, 4ST, 4SG)				--	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 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 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 (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 present)				Not Present	Not Present	
Sum of all pedestrian crossing volumes (PedVol) -- Signalized intersections only					120	
Maximum number of lanes crossed by a pedestrian (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 intersection (present/not present)				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	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	7.795	1.000	7.795	0.46	1.00	3.590
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	2.497	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.331	2.583	0.46	1.00	1.189
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	5.039	$(5)_{TOTAL}-(5)_{FI}$ 0.669	5.212	0.46	1.00	2.400

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	1.189	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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.260	0.128	0.46	1.00	0.059
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.359	$(5)_{TOTAL}-(5)_{FI}$ 0.740	0.365	0.46	1.00	0.168

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	0.059	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)	(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 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}	
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 factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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}**
	(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)	--	--	--	--	0.057

* 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)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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 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 Information and Input Data for Urban and Suburban Roadway Segments

General Information		Location Information	
Analyst	ST	Roadway	MD 189 (Falls Road)
Agency or Company	ATCS	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)	$AADT_{MAX}$ = 66,000 (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 Present, 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)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.273	0.337	1.35	1.00	0.456
Property Damage Only (PDO)	-12.81	1.38	1.34	0.947	$(5)_{TOTAL}-(5)_{FI}$ = 0.727	0.897	1.35	1.00	1.211

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	0.456	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)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.181	0.035	1.35	1.00	0.047
Property Damage Only (PDO)	-5.04	0.45	1.06	0.158	$(5)_{TOTAL}-(5)_{FI}$ = 0.819	0.158	1.35	1.00	0.213

Worksheet 1F -- Single-Vehicle 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 $_{brsv\ (FI)}$ (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 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		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_r**	**Predicted N_{brdwy}**
	$(5)_{TOTAL}$ 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)	(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	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)	(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	1.667	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

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (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
Driveway-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

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

Worksheet 1A -- General Information and Input Data for Urban and Suburban Roadway Segments

General Information		Location Information	
Analyst	ST	Roadway	MD 189 (Falls Road)
Agency or Company	ATCS	Roadway Section	I-279 SPUI to 250 ft west of Great Falls Rd.
Date Performed	06/11/20	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)		--	0.02
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 Present, 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

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 Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-12.34	1.36	1.32	0.067	1.000	0.067	1.15	1.00	0.077
Fatal and Injury (FI)	-12.76	1.28	1.31	0.020	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.280	0.019	1.15	1.00	0.022
Property Damage Only (PDO)	-12.81	1.38	1.34	0.051	$(5)_{TOTAL}-(5)_{FI}$ = 0.720	0.048	1.15	1.00	0.056

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	0.022	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)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.171	0.002	1.15	1.00	0.003
Property Damage Only (PDO)	-5.04	0.45	1.06	0.011	$(5)_{TOTAL}-(5)_{FI}$ = 0.829	0.011	1.15	1.00	0.013

Worksheet 1F -- Single-Vehicle 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 $_{brsv\ (FI)}$ (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

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		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	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_r**	**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)*
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	0.077	0.016	0.000	0.093	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)*
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

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (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

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	0.02	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 Urban and Suburban Arterial Intersections						
General 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	
Input Data				**Base Conditions**	**Site Conditions**	
Intersection type (3ST, 3SG, 4ST, 4SG)				--	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 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	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	
Number of approaches with right-turn-on-red 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 (PedVol) -- Signalized intersections only					491	
Maximum number of lanes crossed by a pedestrian (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 intersection (present/not present)				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)
0.73	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	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	4.821	1.000	4.821	0.63	1.00	3.046
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	1.527	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.329	1.587	0.63	1.00	1.002
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	3.113	$(5)_{TOTAL}-(5)_{FI}$ 0.671	3.235	0.63	1.00	2.044

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	1.002	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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.265	0.083	0.63	1.00	0.053
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.230	$(5)_{TOTAL}-(5)_{FI}$ 0.735	0.232	0.63	1.00	0.147

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	0.053	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}**
	(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 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}	
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 factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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}**
	(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

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; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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
Total	1.365	2.190	3.556

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 Urban and Suburban Arterial Intersections						
General 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	
Input Data				**Base Conditions**	**Site Conditions**	
Intersection type (3ST, 3SG, 4ST, 4SG)				--	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 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 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-red 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 (PedVol) -- Signalized intersections only					44	
Maximum number of lanes crossed by a pedestrian (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 intersection (present/not present)				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	0.92	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	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	7.648	1.000	7.648	0.48	1.00	3.706
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	2.471	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.335	2.559	0.48	1.00	1.240
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	4.915	$(5)_{TOTAL}-(5)_{FI}$ 0.665	5.089	0.48	1.00	2.466

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	1.240	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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.254	0.119	0.48	1.00	0.057
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.344	$(5)_{TOTAL}-(5)_{FI}$ 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)	(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 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}	
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 factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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)	--	--	--	--	--	--	--	--	1.00	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

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; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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 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 Information and Input Data for Urban and Suburban Roadway Segments				
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 Present, 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 Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.276	0.108	1.03	1.00	0.111
Property Damage Only (PDO)	-12.81	1.38	1.34	0.301	$(5)_{TOTAL}-(5)_{FI}$ = 0.724	0.285	1.03	1.00	0.292

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)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.177	0.012	1.03	1.00	0.012
Property Damage Only (PDO)	-5.04	0.45	1.06	0.056	$(5)_{TOTAL}-(5)_{FI}$ = 0.823	0.056	1.03	1.00	0.058

Worksheet 1F -- Single-Vehicle 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 $_{brsv\ (FI)}$ (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 Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		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	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_r**	**Predicted N_{brdwy}**
	$(5)_{TOTAL}$ 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)*
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	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)*
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	0.404	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

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 1D)	0.093	0.194	0.286
Head-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
Driveway-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
Total	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 Information and Input Data for Urban and Suburban Roadway Segments

General Information		Location Information	
Analyst	PK	Roadway	MD 190 River Road
Agency or Company	ATCS	Roadway Section	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 Present, 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	1.09	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 Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.268	0.156	1.01	1.00	0.157
Property Damage Only (PDO)	-12.81	1.38	1.34	0.449	$(5)_{TOTAL}-(5)_{FI}$ = 0.732	0.426	1.01	1.00	0.428

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	0.157	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)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-5.05	0.47	0.86	0.072	1.000	0.072	1.01	1.00	0.073
Fatal and Injury (FI)	-8.71	0.66	0.28	0.014	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.189	0.014	1.01	1.00	0.014
Property Damage Only (PDO)	-5.04	0.45	1.06	0.059	$(5)_{TOTAL}-(5)_{FI}$ = 0.811	0.059	1.01	1.00	0.059

Worksheet 1F -- Single-Vehicle 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 $_{brsv\ (FI)}$ (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

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		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	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_r**	**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	1.01	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)*
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	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)*
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	0.586	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

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (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
Driveway-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	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 Information and Input Data for Urban and Suburban 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 Present, 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

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 Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.262	0.231	0.98	1.00	0.226
Property Damage Only (PDO)	-12.81	1.38	1.34	0.684	$(5)_{TOTAL}-(5)_{FI}$ = 0.738	0.650	0.98	1.00	0.637

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	0.226	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)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.199	0.017	0.98	1.00	0.016
Property Damage Only (PDO)	-5.04	0.45	1.06	0.068	$(5)_{TOTAL}-(5)_{FI}$ = 0.801	0.067	0.98	1.00	0.066

Worksheet 1F -- Single-Vehicle 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 $_{brsv\ (FI)}$ (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 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		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	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_r**	**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)*
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	0.863	0.082	0.000	0.945	0.019	0.018
Fatal 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)*
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	0.863	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

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 1D)	0.188	0.421	0.610
Head-on collisions (from Worksheet 1D)	0.005	0.004	0.009
Angle 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
Driveway-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
Total	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

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections						
General Information				**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	
Input Data				**Base Conditions**	**Site Conditions**	
Intersection type (3ST, 3SG, 4ST, 4SG)				--	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-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 (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-red 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 (PedVol) -- Signalized intersections only					140	
Maximum number of lanes crossed by a pedestrian (n_{lanesx})				--	7	
Number of bus stops within 300 m (1,000 ft) of the intersection				0	3	
Schools within 300 m (1,000 ft) of the intersection (present/not present)				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)
0.81	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**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	12.379	1.000	12.379	0.67	1.00	8.248
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	4.366	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.365	4.517	0.67	1.00	3.010
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	7.598	$(5)_{TOTAL}-(5)_{FI}$ 0.635	7.861	0.67	1.00	5.238

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	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)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.203	0.112	0.67	1.00	0.075
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.446	$(5)_{TOTAL}-(5)_{FI}$ 0.797	0.440	0.67	1.00	0.293

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	0.075	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}**
	(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 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}	
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 factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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)	--	--	--	--	--	--	--	--	1.00	0.152

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	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; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections						
General Information				**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)				--	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 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 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	
Number of approaches with right-turn-on-red 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 (PedVol) -- Signalized intersections only					164	
Maximum number of lanes crossed by a pedestrian (n_{lanesx})				--	7	
Number of bus stops within 300 m (1,000 ft) of the intersection				0	4	
Schools within 300 m (1,000 ft) of the intersection (present/not present)				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	0.83	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 Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	6.755	1.000	6.755	0.46	1.00	3.108
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	2.166	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.332	2.244	0.46	1.00	1.033
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	4.353	$(5)_{TOTAL}-(5)_{FI}$ 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)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.258	0.110	0.46	1.00	0.050
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.311	$(5)_{TOTAL}-(5)_{FI}$ 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}**
	(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 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}	
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 factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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)	--	--	--	--	--	--	--	--	1.00	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}**
	(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)	--	--	--	--	0.050

* 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)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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 Information and Input Data for Urban and Suburban 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 Present, 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 Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-12.34	1.36	1.32	0.028	1.000	0.028	1.08	1.00	0.030
Fatal and Injury (FI)	-12.76	1.28	1.31	0.009	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.293	0.008	1.08	1.00	0.009
Property Damage Only (PDO)	-12.81	1.38	1.34	0.021	$(5)_{TOTAL}-(5)_{FI}$ = 0.707	0.020	1.08	1.00	0.021

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	0.009	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)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.153	0.002	1.08	1.00	0.002
Property Damage Only (PDO)	-5.04	0.45	1.06	0.009	$(5)_{TOTAL}-(5)_{FI}$ = 0.847	0.009	1.08	1.00	0.009

Worksheet 1F -- Single-Vehicle 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 $_{brsv\ (FI)}$ (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 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		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	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_r**	**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)*
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	0.030	0.011	0.004	0.045	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	0.030	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

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (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
Driveway-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

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections						
General Information					**Location 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 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		
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 applicable)				--		
Number of approaches with right-turn-on-red prohibited [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 intersection				0		
Schools within 300 m (1,000 ft) of the intersection (present/not present)				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 Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-8.90	0.82	0.25	0.40	2.219	1.000	2.219	0.89	1.00	1.967
Fatal and Injury (FI)	-11.13	0.93	0.28	0.48	0.851	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.380	0.844	0.89	1.00	0.748
Property Damage Only (PDO)	-8.74	0.77	0.23	0.40	1.386	$(5)_{TOTAL}-(5)_{FI}$ = 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 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	0.748	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)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.288	0.081	0.89	1.00	0.072
Property Damage Only (PDO)	-7.04	0.36	0.25	0.54	0.194	$(5)_{TOTAL}-(5)_{FI}$ = 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}**
	(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 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}	
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 Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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}**
	(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

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; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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 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

Worksheet 1A -- General Information and Input Data for Urban and Suburban 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	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)			--	0.45
AADT (veh/day)	$AADT_{MAX}$ = 66,000 (veh/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 Present, 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 Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-12.34	1.36	1.32	3.864	1.000	3.864	1.08	1.00	4.163
Fatal and Injury (FI)	-12.76	1.28	1.31	1.083	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.266	1.028	1.08	1.00	1.107
Property Damage Only (PDO)	-12.81	1.38	1.34	2.989	$(5)_{TOTAL}-(5)_{FI}$ = 0.734	2.837	1.08	1.00	3.056

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	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

Worksheet 1E -- Single-Vehicle 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 Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.193	0.083	1.08	1.00	0.090
Property Damage Only (PDO)	-5.04	0.45	1.06	0.352	$(5)_{TOTAL}-(5)_{FI}$ = 0.807	0.348	1.08	1.00	0.375

Worksheet 1F -- Single-Vehicle 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 $_{brsv\ (FI)}$ (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 Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		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	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_r**	**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)*
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	4.163	0.465	0.000	4.628	0.019	0.088
Fatal 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)*
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	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

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 1D)	0.921	2.023	2.944
Head-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
Driveway-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
Total	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
Fatal and injury (FI)	1.3	0.45	2.9
Property damage only (PDO)	3.4	0.45	7.6

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections						
General Information				**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 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	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 applicable)				--	Not Applicable	
Number of approaches with right-turn-on-red prohibited [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) -- Signalized intersections only					6	
Maximum number of lanes crossed by a pedestrian (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 intersection (present/not present)				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)
0.86	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	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-12.13	1.11	0.26	0.33	15.055	1.000	15.055	0.66	1.00	9.910
Fatal and Injury (FI)	-11.58	1.02	0.17	0.30	4.085	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.288	4.330	0.66	1.00	2.850
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 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	2.850	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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.273	0.157	0.66	1.00	0.103
Property Damage Only (PDO)	-9.08	0.45	0.33	0.53	0.390	$(5)_{TOTAL}-(5)_{FI}$ 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)	(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 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}	
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 factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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)	--	--	--	--	--	--	--	--	1.00	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}**
	(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

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; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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

Worksheet 1A -- General Information and Input Data for Urban and Suburban Roadway Segments

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		--	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 Present, 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 Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.313	0.149	1.35	1.00	0.201
Property Damage Only (PDO)	-12.53	1.38	1.08	0.311	$(5)_{TOTAL}-(5)_{FI}$ = 0.687	0.327	1.35	1.00	0.442

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	0.201	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

Worksheet 1E -- Single-Vehicle 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 Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.257	0.033	1.35	1.00	0.045
Property Damage Only (PDO)	-8.50	0.84	0.97	0.103	$(5)_{TOTAL}-(5)_{FI}$ = 0.743	0.095	1.35	1.00	0.129

Worksheet 1F -- Single-Vehicle 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 $_{brsv\ (FI)}$ (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 Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		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	0.182	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)
Crash Severity Level	**Initial N_{brdwy}**	**Proportion of total crashes (f_{dwy})**	**Adjusted N_{brdwy}**	**Combined CMFs**	**Calibration factor, C_r**	**Predicted N_{brdwy}**
	$(5)_{TOTAL}$ from Worksheet 1G	from Table 12-7	$(2)_{TOTAL}$ * (3)	(6) from Worksheet 1B		(4)*(5)*(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)*
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	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)*
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	0.643	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

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)** (3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	**Property damage only (PDO)** (5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	**Total** (6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (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
Driveway-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)
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 Urban and Suburban Arterial Intersections						
General 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	
Input Data				**Base Conditions**	**Site Conditions**	
Intersection type (3ST, 3SG, 4ST, 4SG)				--	4SG	
AADT $_{major}$ (veh/day)	$AADT_{MAX}$ =	67,700	(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 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 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 applicable)				--	Permissive	
Number of approaches with right-turn-on-red 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 (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 intersection				0	4	
Schools within 300 m (1,000 ft) of the intersection (present/not present)				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)
0.90	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	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	3.332	1.000	3.332	0.74	1.00	2.464
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	1.000	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.311	1.037	0.74	1.00	0.767
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	2.210	$(5)_{TOTAL}-(5)_{FI}$ = 0.689	2.294	0.74	1.00	1.697

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	0.767	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)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.300	0.079	0.74	1.00	0.059
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.183	$(5)_{TOTAL}-(5)_{FI}$ = 0.700	0.185	0.74	1.00	0.137

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	0.059	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	--	--	--	--	--
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 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}	
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 factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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)	--	--	--	--	--	--	--	--	1.00	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

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; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections						
General Information				**Location Information**		
Analyst	TL			Roadway	MD 28 Key W Ave	
Agency or Company	ATCS			Intersection	At Omega Dr/Medical Center Dr	
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 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	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-red 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 (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 intersection				0	10	
Schools within 300 m (1,000 ft) of the intersection (present/not present)				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	0.78	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	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	8.514	1.000	8.514	0.40	1.00	3.393
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	2.794	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.340	2.893	0.40	1.00	1.153
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	5.429	$(5)_{TOTAL}-(5)_{FI}$ 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 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	1.153	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)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.244	0.120	0.40	1.00	0.048
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.368	$(5)_{TOTAL}-(5)_{FI}$ 0.756	0.372	0.40	1.00	0.148

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	0.048	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}**
	(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 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}	
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 factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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)	(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	3.393	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

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; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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 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 Information and Input Data for Urban and Suburban 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	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)	--	11,796
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 Present, 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

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 Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.292	0.018	0.92	1.00	0.016
Property Damage Only (PDO)	-12.81	1.38	1.34	0.045	$(5)_{TOTAL}-(5)_{FI}$ = 0.708	0.043	0.92	1.00	0.039

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	0.016	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)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.154	0.003	0.92	1.00	0.003
Property Damage Only (PDO)	-5.04	0.45	1.06	0.018	$(5)_{TOTAL}-(5)_{FI}$ = 0.846	0.018	0.92	1.00	0.016

Worksheet 1F -- Single-Vehicle 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 $_{brsv\ (FI)}$ (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

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		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	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_r**	**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)*
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	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

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (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
Driveway-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

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections						
General Information					**Location Information**	
Analyst	TL				Roadway	Omega Dr
Agency or Company	ATCS				Intersection	At Research Blvd/Driveway
Date Performed	02/17/21				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)		--	11,757
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 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 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 applicable)					--	
Number of approaches with right-turn-on-red prohibited [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 intersection					0	
Schools within 300 m (1,000 ft) of the intersection (present/not present)					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)
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	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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 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	0.310	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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.310	0.108	0.61	1.00	0.066
Property Damage Only (PDO)	-8.36	0.25	0.55	1.29	0.239	$(5)_{TOTAL}-(5)_{FI}$ = 0.690	0.239	0.61	1.00	0.146

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	0.066	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}**
	(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 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}	
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 Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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}**
	(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

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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 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 Information and Input Data for Urban and Suburban 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	02/17/21	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)	--	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 Present, 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

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 Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.292	0.105	0.91	1.00	0.096
Property Damage Only (PDO)	-12.81	1.38	1.34	0.271	$(5)_{TOTAL}-(5)_{FI}$ = 0.708	0.254	0.91	1.00	0.232

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	0.096	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)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.154	0.019	0.91	1.00	0.018
Property Damage Only (PDO)	-5.04	0.45	1.06	0.105	$(5)_{TOTAL}-(5)_{FI}$ = 0.846	0.106	0.91	1.00	0.097

Worksheet 1F -- Single-Vehicle 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 $_{brsv\ (FI)}$ (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

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		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	0.014	
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}**	**Proportion of total crashes (f_{dwy})**	**Adjusted N_{brdwy}**	**Combined CMFs**	**Calibration factor, C_r**	**Predicted N_{brdwy}**
	$(5)_{TOTAL}$ 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)*
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	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)*
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	0.328	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

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)** (3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	**Property damage only (PDO)** (5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	**Total** (6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (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
Total	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

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections						
General Information				**Location Information**		
Analyst	TL			Roadway	Omega Dr/Fields Rd	
Agency or Company	ATCS			Intersection	At I-270 SB Off-Ramp	
Date Performed	02/17/21			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)	--	11,723	
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 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:				--	--	
				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 applicable)				--		
Number of approaches with right-turn-on-red prohibited [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 intersection				0		
Schools within 300 m (1,000 ft) of the intersection (present/not present)				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	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	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-13.36	1.11	0.41	0.80	1.388	1.000	1.388	0.91	1.00	1.265
Fatal and Injury (FI)	-14.01	1.16	0.30	0.69	0.479	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.334	0.464	0.91	1.00	0.423
Property Damage Only (PDO)	-15.38	1.20	0.51	0.77	0.954	$(5)_{TOTAL}-(5)_{FI}$ = 0.666	0.924	0.91	1.00	0.842

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	0.423	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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.313	0.092	0.91	1.00	0.084
Property Damage Only (PDO)	-8.36	0.25	0.55	1.29	0.200	$(5)_{TOTAL}-(5)_{FI}$ = 0.687	0.203	0.91	1.00	0.185

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	0.084	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 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	1.265	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 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}	
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 Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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}**
	(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

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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
Total	0.564	1.027	1.591

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

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections						
General Information				**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 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 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]				--	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 applicable)				--	Permissive	
Number of approaches with right-turn-on-red 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 (PedVol) -- Signalized intersections only					129	
Maximum number of lanes crossed by a pedestrian (n_{lanesx})				--	7	
Number of bus stops within 300 m (1,000 ft) of the intersection				0	4	
Schools within 300 m (1,000 ft) of the intersection (present/not present)				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	0.92	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	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	7.839	1.000	7.839	0.49	1.00	3.841
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	2.546	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.336	2.637	0.49	1.00	1.292
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	5.024	$(5)_{TOTAL}-(5)_{FI}$ 0.664	5.202	0.49	1.00	2.549

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	1.292	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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.250	0.118	0.49	1.00	0.058
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.348	$(5)_{TOTAL}-(5)_{FI}$ 0.750	0.353	0.49	1.00	0.173

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	0.058	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)	(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 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}	
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 factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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)	(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	3.841	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

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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 Information and Input Data for Urban and Suburban 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 Present, 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 Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.275	0.238	1.01	1.00	0.241
Property Damage Only (PDO)	-12.81	1.38	1.34	0.663	$(5)_{TOTAL}-(5)_{FI}$ = 0.725	0.627	1.01	1.00	0.636

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	0.241	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)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.178	0.026	1.01	1.00	0.026
Property Damage Only (PDO)	-5.04	0.45	1.06	0.121	$(5)_{TOTAL}-(5)_{FI}$ = 0.822	0.120	1.01	1.00	0.122

Worksheet 1F -- Single-Vehicle 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 $_{brsv\ (FI)}$ (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

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		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	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_r**	**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	1.01	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)*
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	0.878	0.148	0.000	1.026	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)*
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

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (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
Driveway-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, $N_{predicted\ rs}$ (crashes/year)**	**Roadway segment length, L (mi)**	**Crash rate (crashes/mi/year)**
	(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

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections						
General Information					**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	
				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)	--	26,297	
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 left-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 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				--	Protected	
Type of left-turn signal phasing for Leg #4 (if applicable)				--	Not Applicable	
Number of approaches with right-turn-on-red 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 (PedVol) -- Signalized intersections only					231	
Maximum number of lanes crossed by a pedestrian (n_{lanesx})				--	5	
Number of bus stops within 300 m (1,000 ft) of the intersection				0	2	
Schools within 300 m (1,000 ft) of the intersection (present/not present)				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)
0.86	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	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-12.13	1.11	0.26	0.33	4.228	1.000	4.228	0.71	1.00	2.991
Fatal and Injury (FI)	-11.58	1.02	0.17	0.30	1.334	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.332	1.404	0.71	1.00	0.993
Property Damage Only (PDO)	-13.24	1.14	0.30	0.36	2.684	$(5)_{TOTAL}-(5)_{FI}$ 0.668	2.824	0.71	1.00	1.998

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	0.993	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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.284	0.082	0.71	1.00	0.058
Property Damage Only (PDO)	-9.08	0.45	0.33	0.53	0.199	$(5)_{TOTAL}-(5)_{FI}$ 0.716	0.206	0.71	1.00	0.146

Worksheet 2F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1) Collision Type	(2) Proportion of Collision Type$_{(FI)}$	(3) Predicted N $_{bisv\ (FI)}$ (crashes/year)	(4) Proportion of Collision Type $_{(PDO)}$	(5) Predicted N $_{bisv\ (PDO)}$ (crashes/year)	(6) 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) Crash Severity Level	(2) Predicted N_{bimv}	(3) Predicted N_{bisv}	(4) Predicted N_{bi}	(5) f_{pedi}	(7)* 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 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}	
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) Crash Severity Level	(2) SPF Coefficients from Table 12-14					(3) Overdispersion Parameter, k	(4) $N_{pedbase}$ from Equation 12-29	(5) Combined CMF (4) from Worksheet 2H	(6) Calibration factor, C_i	(7) Predicted N_{pedi} (4)*(5)*(6)
	a	b	c	d	e					
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)	--	--	--	--	--	--	--	--	1.00	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_{bi}**	**f_{bikei}**	**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

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; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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 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

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections						
General Information				**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 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	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 (if applicable)				--	Permissive	
Number of approaches with right-turn-on-red 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 (PedVol) -- Signalized intersections only					54	
Maximum number of lanes crossed by a pedestrian (n_{lanesx})				--	5	
Number of bus stops within 300 m (1,000 ft) of the intersection				0	2	
Schools within 300 m (1,000 ft) of the intersection (present/not present)				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	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	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	3.953	1.000	3.953	0.60	1.00	2.376
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	1.233	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.324	1.283	0.60	1.00	0.771
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	2.567	$(5)_{TOTAL}-(5)_{FI}$ 0.676	2.670	0.60	1.00	1.605

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	0.771	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)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.274	0.075	0.60	1.00	0.045
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.196	$(5)_{TOTAL}-(5)_{FI}$ 0.726	0.198	0.60	1.00	0.119

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	0.045	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}**
	(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 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}	
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 Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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)	(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	2.376	0.164	2.540	0.015	0.038
Fatal and injury (FI)	--	--	--	--	0.038

* 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; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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 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

Worksheet 1A -- General Information and Input Data for Urban and Suburban Roadway Segments

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 Present, 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

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 Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.284	0.021	1.05	1.00	0.022
Property Damage Only (PDO)	-12.81	1.38	1.34	0.056	$(5)_{TOTAL}-(5)_{FI}$ = 0.716	0.053	1.05	1.00	0.055

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	0.022	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)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.164	0.003	1.05	1.00	0.003
Property Damage Only (PDO)	-5.04	0.45	1.06	0.016	$(5)_{TOTAL}-(5)_{FI}$ = 0.836	0.016	1.05	1.00	0.016

Worksheet 1F -- Single-Vehicle 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 $_{brsv\ (FI)}$ (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

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		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	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_r**	**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)*
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	0.077	0.020	0.000	0.097	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)*
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	0.020	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

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (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	0.055	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
Total	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 Urban and Suburban Arterial Intersections						
General Information				**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	
Input 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 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	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 (if applicable)				--	Not Applicable	
Number of approaches with right-turn-on-red 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 (PedVol) -- Signalized intersections only					54	
Maximum number of lanes crossed by a pedestrian (n_{lanesx})				--	5	
Number of bus stops within 300 m (1,000 ft) of the intersection				0	3	
Schools within 300 m (1,000 ft) of the intersection (present/not present)				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)
0.93	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 Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-12.13	1.11	0.26	0.33	3.449	1.000	3.449	0.81	1.00	2.804
Fatal and Injury (FI)	-11.58	1.02	0.17	0.30	1.086	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.331	1.141	0.81	1.00	0.928
Property Damage Only (PDO)	-13.24	1.14	0.30	0.36	2.196	$(5)_{TOTAL}-(5)_{FI}$ = 0.669	2.308	0.81	1.00	1.876

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	0.928	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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.303	0.088	0.81	1.00	0.071
Property Damage Only (PDO)	-9.08	0.45	0.33	0.53	0.195	$(5)_{TOTAL}-(5)_{FI}$ = 0.697	0.202	0.81	1.00	0.164

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	0.071	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)	(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 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}	
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 factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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}**
	(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

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; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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 and Input Data for Urban and Suburban Roadway 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 Present, 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)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-12.34	1.36	1.32	0.132	1.000	0.132	0.98	1.00	0.130
Fatal and Injury (FI)	-12.76	1.28	1.31	0.040	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.283	0.037	0.98	1.00	0.037
Property Damage Only (PDO)	-12.81	1.38	1.34	0.100	$(5)_{TOTAL}-(5)_{FI}$ = 0.717	0.095	0.98	1.00	0.093

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	0.037	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)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.166	0.005	0.98	1.00	0.005
Property Damage Only (PDO)	-5.04	0.45	1.06	0.026	$(5)_{TOTAL}-(5)_{FI}$ = 0.834	0.027	0.98	1.00	0.026

Worksheet 1F -- Single-Vehicle 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 $_{brsv\ (FI)}$ (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

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		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	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_r**	**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)*
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	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)*
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	0.130	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

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 1D)	0.031	0.062	0.092
Head-on collisions (from Worksheet 1D)	0.001	0.001	0.001
Angle 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
Driveway-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
Total	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 Urban and Suburban Arterial Intersections						
General 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	
Input 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 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 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	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-red 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 (PedVol) -- Signalized intersections only					54	
Maximum number of lanes crossed by a pedestrian (n_{lanesx})				--	5	
Number of bus stops within 300 m (1,000 ft) of the intersection				0	6	
Schools within 300 m (1,000 ft) of the intersection (present/not present)				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)
0.73	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	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	5.243	1.000	5.243	0.58	1.00	3.055
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	1.629	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.322	1.688	0.58	1.00	0.984
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	3.430	$(5)_{TOTAL}-(5)_{FI}$ = 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)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.278	0.102	0.58	1.00	0.060
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.262	$(5)_{TOTAL}-(5)_{FI}$ = 0.722	0.266	0.58	1.00	0.155

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	0.060	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}**
	(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 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}	
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 factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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)*
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	3.055	0.215	3.269	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

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections						
General Information				**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	
Input 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 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	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 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 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 intersection				0	2	
Schools within 300 m (1,000 ft) of the intersection (present/not present)				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)
0.73	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)			(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}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	6.927	1.000	6.927	0.51	1.00	3.564
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	2.185	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.326	2.261	0.51	1.00	1.163
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	4.511	$(5)_{TOTAL}-(5)_{FI}$ 0.674	4.667	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)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.269	0.124	0.51	1.00	0.064
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.332	$(5)_{TOTAL}-(5)_{FI}$ 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}**
	(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 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}	
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 Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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)	--	--	--	--	--	--	--	--	1.00	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}**
	(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

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J
MULTIPLE-VEHICLE			
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)	(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)	2.6

Worksheet 1A -- General Information and Input Data for Urban and Suburban 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	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 Present, 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 Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-12.34	1.36	1.32	1.012	1.000	1.012	0.98	1.00	0.990
Fatal and Injury (FI)	-12.76	1.28	1.31	0.301	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.280	0.284	0.98	1.00	0.278
Property Damage Only (PDO)	-12.81	1.38	1.34	0.772	$(5)_{TOTAL}-(5)_{FI}$ = 0.720	0.728	0.98	1.00	0.713

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	0.278	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)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.170	0.037	0.98	1.00	0.036
Property Damage Only (PDO)	-5.04	0.45	1.06	0.180	$(5)_{TOTAL}-(5)_{FI}$ = 0.830	0.180	0.98	1.00	0.176

Worksheet 1F -- Single-Vehicle 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 $_{brsv\ (FI)}$ (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

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		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	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)
Crash Severity Level	**Initial N_{brdwy}**	**Proportion of total crashes (f_{dwy})**	**Adjusted N_{brdwy}**	**Combined CMFs**	**Calibration factor, C_r**	**Predicted N_{brdwy}**
	$(5)_{TOTAL}$ 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)*
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	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)*
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	0.990	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)
Collision type	**Fatal and injury (FI)** (3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	**Property damage only (PDO)** (5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	**Total** (6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (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, $N_{predicted\ rs}$ (crashes/year)** (Total) from Worksheet 1K	**Roadway segment length, L (mi)**	**Crash rate (crashes/mi/year)** (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 Urban and Suburban Arterial Intersections						
General 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	
Input 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 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 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				--	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-red 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 (PedVol) -- Signalized intersections only					122	
Maximum number of lanes crossed by a pedestrian (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 intersection (present/not present)				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	0.91	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**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	5.208	1.000	5.208	0.47	1.00	2.425
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	1.653	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.330	1.717	0.47	1.00	0.799
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	3.362	$(5)_{TOTAL}-(5)_{FI}$ = 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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.263	0.089	0.47	1.00	0.041
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.247	$(5)_{TOTAL}-(5)_{FI}$ = 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)	(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 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}	
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 Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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}**
	(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

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; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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
Total	0.983	1.741	2.724

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 Urban and Suburban Arterial Intersections						
General 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	
Input Data				**Base Conditions**	**Site Conditions**	
Intersection type (3ST, 3SG, 4ST, 4SG)				--	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 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 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	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	
Number of approaches with right-turn-on-red 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 (PedVol) -- Signalized intersections only					424	
Maximum number of lanes crossed by a pedestrian (n_{lanesx})				--	6	
Number of bus stops within 300 m (1,000 ft) of the intersection				0	3	
Schools within 300 m (1,000 ft) of the intersection (present/not present)				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	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	7.292	1.000	7.292	0.46	1.00	3.358
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	2.369	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.337	2.455	0.46	1.00	1.131
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	4.667	$(5)_{TOTAL}-(5)_{FI}$ = 0.663	4.837	0.46	1.00	2.228

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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.21	0.68	0.27	0.36	0.437	1.000	0.437	0.46	1.00	0.201
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.108	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.250	0.109	0.46	1.00	0.050
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.324	$(5)_{TOTAL}-(5)_{FI}$ = 0.750	0.328	0.46	1.00	0.151

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	0.151	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)	(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 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}	
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 factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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}**
	(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

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; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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 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 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections						
General Information				**Location Information**		
Analyst	TL			Roadway	Rockledge Drive	
Agency or Company	ATCS			Intersection	ckledge Dr at I-270 SB Off-Ramp/I-270 SB Ramp Connect	
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 lanes (0,1,2)				0	0	
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 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 applicable)				--	Not Applicable	
Number of approaches with right-turn-on-red prohibited [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) -- Signalized intersections only					3	
Maximum number of lanes crossed by a pedestrian (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 intersection (present/not present)				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)
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	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-12.13	1.11	0.26	0.33	4.616	1.000	4.616	0.82	1.00	3.797
Fatal and Injury (FI)	-11.58	1.02	0.17	0.30	1.365	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.311	1.437	0.82	1.00	1.182
Property Damage Only (PDO)	-13.24	1.14	0.30	0.36	3.019	$(5)_{TOTAL}-(5)_{FI}$ 0.689	3.179	0.82	1.00	2.615

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)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.320	0.123	0.82	1.00	0.101
Property Damage Only (PDO)	-9.08	0.45	0.33	0.53	0.250	$(5)_{TOTAL}-(5)_{FI}$ 0.680	0.261	0.82	1.00	0.215

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	0.101	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)	(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 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}	
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 Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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)	(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	3.797	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

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; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections						
General Information				**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 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	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 applicable)				--	Not Applicable	
Number of approaches with right-turn-on-red 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 (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 intersection				0	0	
Schools within 300 m (1,000 ft) of the intersection (present/not present)				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)
0.86	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	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-12.13	1.11	0.26	0.33	6.421	1.000	6.421	0.69	1.00	4.444
Fatal and Injury (FI)	-11.58	1.02	0.17	0.30	1.832	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.301	1.932	0.69	1.00	1.337
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 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	1.337	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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.315	0.142	0.69	1.00	0.098
Property Damage Only (PDO)	-9.08	0.45	0.33	0.53	0.294	$(5)_{TOTAL}-(5)_{FI}$ 0.685	0.310	0.69	1.00	0.214

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	0.098	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)	(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 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}	
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 Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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}**
	(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)	--	--	--	--	0.052

* 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; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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 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

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections						
General Information				**Location 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 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	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 applicable)				--	Permissive	
Number of approaches with right-turn-on-red 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 (PedVol) -- Signalized intersections only					108	
Maximum number of lanes crossed by a pedestrian (n_{lanesx})				--	7	
Number of bus stops within 300 m (1,000 ft) of the intersection				0	4	
Schools within 300 m (1,000 ft) of the intersection (present/not present)				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 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)
0.81	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 Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	16.156	1.000	16.156	0.68	1.00	10.978
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	5.752	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.367	5.936	0.68	1.00	4.033
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	9.903	$(5)_{TOTAL}-(5)_{FI}$ = 0.633	10.220	0.68	1.00	6.944

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	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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.21	0.68	0.27	0.36	0.699	1.000	0.699	0.68	1.00	0.475
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.141	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.199	0.139	0.68	1.00	0.094
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.566	$(5)_{TOTAL}-(5)_{FI}$ = 0.801	0.560	0.68	1.00	0.380

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	0.094	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)	(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 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}	
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 Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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)	--	--	--	--	--	--	--	--	1.00	0.179

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	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; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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 Information and Input Data for Urban and Suburban 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 Present, 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 Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.261	0.161	1.61	1.00	0.260
Property Damage Only (PDO)	-12.81	1.38	1.34	0.481	$(5)_{TOTAL}-(5)_{FI}$ = 0.739	0.457	1.61	1.00	0.737

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	0.260	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
Head-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
Sideswipe, 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

Worksheet 1E -- Single-Vehicle 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 Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.202	0.011	1.61	1.00	0.018
Property Damage Only (PDO)	-5.04	0.45	1.06	0.044	$(5)_{TOTAL}-(5)_{FI}$ = 0.798	0.043	1.61	1.00	0.070

Worksheet 1F -- Single-Vehicle 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 $_{brsv\ (FI)}$ (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	0.070	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 Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		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	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_r**	**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)*
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	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)*
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	0.997	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

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)** (3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	**Property damage only (PDO)** (5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	**Total** (6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 1D)	0.216	0.488	0.704
Head-on collisions (from Worksheet 1D)	0.005	0.005	0.010
Angle 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
Driveway-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
Total	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)** (Total) from Worksheet 1K	**Roadway segment length, L (mi)**	**Crash rate (crashes/mi/year)** (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

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections						
General Information				**Location 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 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	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 applicable)				--	Not Applicable	
Number of approaches with right-turn-on-red 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 (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 intersection				0	0	
Schools within 300 m (1,000 ft) of the intersection (present/not present)				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)
0.93	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	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-12.13	1.11	0.26	0.33	10.482	1.000	10.482	0.77	1.00	8.100
Fatal and Injury (FI)	-11.58	1.02	0.17	0.30	3.020	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.305	3.199	0.77	1.00	2.472
Property Damage Only (PDO)	-13.24	1.14	0.30	0.36	6.875	$(5)_{TOTAL}-(5)_{FI}$ = 0.695	7.283	0.77	1.00	5.628

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	2.472	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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.265	0.116	0.77	1.00	0.090
Property Damage Only (PDO)	-9.08	0.45	0.33	0.53	0.305	$(5)_{TOTAL}-(5)_{FI}$ = 0.735	0.322	0.77	1.00	0.249

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	0.090	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)	(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 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}	
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 Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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}**
	(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)	--	--	--	--	0.093

* 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; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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 Information and Input Data for Urban and Suburban 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 Present, 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 Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.271	0.402	1.18	1.00	0.475
Property Damage Only (PDO)	-12.81	1.38	1.34	1.139	$(5)_{TOTAL}-(5)_{FI}$ = 0.729	1.079	1.18	1.00	1.276

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	0.475	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)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.184	0.039	1.18	1.00	0.046
Property Damage Only (PDO)	-5.04	0.45	1.06	0.173	$(5)_{TOTAL}-(5)_{FI}$ = 0.816	0.172	1.18	1.00	0.203

Worksheet 1F -- Single-Vehicle 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 $_{brsv\ (FI)}$ (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

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		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	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_r**	**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)	--	0.284	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)
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)*
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	1.750	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

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)** (3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	**Property damage only (PDO)** (5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	**Total** (6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 1D)	0.395	0.844	1.239
Head-on collisions (from Worksheet 1D)	0.009	0.009	0.018
Angle 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
Driveway-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
Total	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

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections						
General Information				**Location 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 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	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 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 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 intersection				0	2	
Schools within 300 m (1,000 ft) of the intersection (present/not present)				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)
0.81	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 Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	7.450	1.000	7.450	0.63	1.00	4.666
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	2.435	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.339	2.524	0.63	1.00	1.581
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	4.752	$(5)_{TOTAL}-(5)_{FI}$ 0.661	4.926	0.63	1.00	3.085

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	1.581	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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.246	0.108	0.63	1.00	0.067
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.326	$(5)_{TOTAL}-(5)_{FI}$ 0.754	0.329	0.63	1.00	0.206

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	0.067	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 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}	
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 Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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)	(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	4.666	0.273	4.939	0.015	0.074
Fatal and injury (FI)	--	--	--	--	0.074

* 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)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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 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	5.1
Fatal and injury (FI)	1.8
Property damage only (PDO)	3.3

Worksheet 1A -- General Information and Input Data for Urban and Suburban Roadway Segments

General Information		Location Information	
Analyst	TL	Roadway	MD 28
Agency or Company	ATCS	Roadway Section	250 ft east of Nelson St. to 250 ft west of Laird 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)		--	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 Present, 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 Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.302	0.735	1.16	1.00	0.856
Property Damage Only (PDO)	-11.95	1.33	0.59	1.692	$(5)_{TOTAL}-(5)_{FI}$ = 0.698	1.700	1.16	1.00	1.980

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	0.856	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)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.270	0.074	1.16	1.00	0.086
Property Damage Only (PDO)	-6.29	0.56	1.93	0.193	$(5)_{TOTAL}-(5)_{FI}$ = 0.730	0.199	1.16	1.00	0.232

Worksheet 1F -- Single-Vehicle 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 $_{brsv\ (FI)}$ (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

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		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	0.102	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_r**	**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)*
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	2.835	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)*
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	2.835	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

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 1D)	0.723	1.667	2.390
Head-on collisions (from Worksheet 1D)	0.029	0.040	0.069
Angle 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
Driveway-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
Total	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

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections						
General Information				**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	
Input 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 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	2	
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				--	Permissive	
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-red 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 (PedVol) -- Signalized intersections only					240	
Maximum number of lanes crossed by a pedestrian (n_{lanesx})				--	3	
Number of bus stops within 300 m (1,000 ft) of the intersection				0	4	
Schools within 300 m (1,000 ft) of the intersection (present/not present)				Not Present	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)
0.81	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	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	4.841	1.000	4.841	0.71	1.00	3.428
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	1.615	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.348	1.684	0.71	1.00	1.193
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	3.028	$(5)_{TOTAL}-(5)_{FI}$ 0.652	3.157	0.71	1.00	2.236

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	2.236	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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.232	0.061	0.71	1.00	0.043
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.204	$(5)_{TOTAL}-(5)_{FI}$ 0.768	0.201	0.71	1.00	0.142

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	0.043	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)	(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 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}	
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)
Crash Severity Level	**SPF Coefficients**					**Overdispersion Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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)	(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	3.428	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; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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 Information and Input Data for Urban and Suburban 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		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)	--	39,304
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 Present, 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)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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

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	0.345	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

Worksheet 1E -- Single-Vehicle 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 Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.214	0.034	1.18	1.00	0.040
Property Damage Only (PDO)	-8.50	0.84	0.97	0.132	$(5)_{TOTAL}-(5)_{FI}$ = 0.786	0.126	1.18	1.00	0.149

Worksheet 1F -- Single-Vehicle 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 $_{brsv\ (FI)}$ (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

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		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	0.182	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_r**	**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)*
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	1.215	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	1.215	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

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (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
Driveway-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
Total	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 Urban and Suburban Arterial Intersections						
General Information				**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)				--	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-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 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 (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 present)				Not Present	Not Present	
Sum of all pedestrian crossing volumes (PedVol) -- Signalized intersections only					120	
Maximum number of lanes crossed by a pedestrian (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 intersection (present/not present)				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	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	7.867	1.000	7.867	0.46	1.00	3.623
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	2.520	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.331	2.607	0.46	1.00	1.200
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	5.085	$(5)_{TOTAL}-(5)_{FI}$ 0.669	5.260	0.46	1.00	2.422

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	1.200	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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.259	0.129	0.46	1.00	0.059
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.362	$(5)_{TOTAL}-(5)_{FI}$ 0.741	0.368	0.46	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	0.059	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)	(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 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}	
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 factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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)	--	--	--	--	--	--	--	--	1.00	0.227

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	3.623	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

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; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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 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 Information and Input Data for Urban and Suburban 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 Present, 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)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-12.34	1.36	1.32	1.299	1.000	1.299	1.35	1.00	1.755
Fatal and Injury (FI)	-12.76	1.28	1.31	0.374	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.273	0.354	1.35	1.00	0.478
Property Damage Only (PDO)	-12.81	1.38	1.34	0.998	$(5)_{TOTAL}-(5)_{FI}$ = 0.727	0.945	1.35	1.00	1.276

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	0.478	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
Head-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
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	0.114

Worksheet 1E -- Single-Vehicle 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 Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.182	0.036	1.35	1.00	0.048
Property Damage Only (PDO)	-5.04	0.45	1.06	0.161	$(5)_{TOTAL}-(5)_{FI}$ = 0.818	0.160	1.35	1.00	0.217

Worksheet 1F -- Single-Vehicle 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 $_{brsv\ (FI)}$ (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

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		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	0.039	
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_r**	**Predicted N_{brdwy}**
	$(5)_{TOTAL}$ from Worksheet 1G	from Table 12-7	$(2)_{TOTAL}$ * (3)	(6) from Worksheet 1B		(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)*
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	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)*
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	1.755	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

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 1D)	0.398	0.845	1.243
Head-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
Driveway-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
Total	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		(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

Worksheet 1A -- General Information and Input Data for Urban and Suburban Roadway Segments

General Information		Location Information	
Analyst	TL	Roadway	MD 189 (Falls Road)
Agency or Company	ATCS	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)	$AADT_{MAX}$ = 66,000 (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 Present, 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

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 Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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

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	0.022	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
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

Worksheet 1E -- Single-Vehicle 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 Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.172	0.002	1.15	1.00	0.003
Property Damage Only (PDO)	-5.04	0.45	1.06	0.012	$(5)_{TOTAL}-(5)_{FI}$ = 0.828	0.012	1.15	1.00	0.013

Worksheet 1F -- Single-Vehicle 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 $_{brsv\ (FI)}$ (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

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		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	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_r**	**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)*
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	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)*
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	0.079	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

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J
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
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	0.057	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	0.032	0.070	0.103

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	0.02	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 Urban and Suburban Arterial Intersections						
General 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	
Input Data				**Base Conditions**	**Site Conditions**	
Intersection type (3ST, 3SG, 4ST, 4SG)				--	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 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	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	
Number of approaches with right-turn-on-red 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 (PedVol) -- Signalized intersections only					491	
Maximum number of lanes crossed by a pedestrian (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 intersection (present/not present)				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)
0.73	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	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	4.913	1.000	4.913	0.63	1.00	3.104
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	1.558	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.329	1.618	0.63	1.00	1.022
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	3.172	$(5)_{TOTAL}-(5)_{FI}$ 0.671	3.295	0.63	1.00	2.082

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	1.022	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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.21	0.68	0.27	0.36	0.320	1.000	0.320	0.63	1.00	0.202
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.084	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.264	0.085	0.63	1.00	0.053
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.234	$(5)_{TOTAL}-(5)_{FI}$ 0.736	0.236	0.63	1.00	0.149

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	0.053	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)	(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 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}	
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 factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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)	--	--	--	--	--	--	--	--	1.00	0.264

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	3.104	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

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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 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 Urban and Suburban Arterial Intersections						
General Information				**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	
Input Data				**Base Conditions**	**Site Conditions**	
Intersection type (3ST, 3SG, 4ST, 4SG)				--	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-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 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	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 present)				Not Present	Not Present	
Sum of all pedestrian crossing volumes (PedVol) -- Signalized intersections only					44	
Maximum number of lanes crossed by a pedestrian (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 intersection (present/not present)				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	0.92	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	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	7.130	1.000	7.130	0.48	1.00	3.455
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	2.290	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.333	2.372	0.48	1.00	1.149
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	4.594	$(5)_{TOTAL}-(5)_{FI}$ 0.667	4.758	0.48	1.00	2.306

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	1.149	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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.21	0.68	0.27	0.36	0.446	1.000	0.446	0.48	1.00	0.216
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.113	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.257	0.115	0.48	1.00	0.056
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.326	$(5)_{TOTAL}-(5)_{FI}$ 0.743	0.331	0.48	1.00	0.160

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	0.056	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}**	**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 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}	
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 factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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)	--	--	--	--	--	--	--	--	1.00	0.119

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	3.455	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

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; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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 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)	2.5

Worksheet 1A -- General Information and Input Data for Urban and Suburban 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 Present, 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 Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.277	0.101	1.03	1.00	0.104
Property Damage Only (PDO)	-12.81	1.38	1.34	0.279	$(5)_{TOTAL}-(5)_{FI}$ = 0.723	0.264	1.03	1.00	0.271

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	0.104	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)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.175	0.012	1.03	1.00	0.012
Property Damage Only (PDO)	-5.04	0.45	1.06	0.055	$(5)_{TOTAL}-(5)_{FI}$ = 0.825	0.055	1.03	1.00	0.056

Worksheet 1F -- Single-Vehicle 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 $_{brsv\ (FI)}$ (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 Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		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	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_r**	**Predicted N_{brdwy}**
	$(5)_{TOTAL}$ 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)*
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	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)*
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	0.374	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

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (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
Driveway-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	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 Information and Input Data for Urban and Suburban 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	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 Present, 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

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 Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.261	0.258	0.98	1.00	0.253
Property Damage Only (PDO)	-12.81	1.38	1.34	0.770	$(5)_{TOTAL}-(5)_{FI}$ = 0.739	0.732	0.98	1.00	0.717

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	0.253	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)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.202	0.018	0.98	1.00	0.017
Property Damage Only (PDO)	-5.04	0.45	1.06	0.071	$(5)_{TOTAL}-(5)_{FI}$ = 0.798	0.069	0.98	1.00	0.068

Worksheet 1F -- Single-Vehicle 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 $_{brsv\ (FI)}$ (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

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		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	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_r**	**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)*
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	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)*
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	0.970	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

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (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
Driveway-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)	(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	0.08	13.5
Fatal and injury (FI)	0.3	0.08	3.7
Property damage only (PDO)	0.8	0.08	9.8

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections						
General Information				**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 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	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 applicable)				--	Permissive	
Number of approaches with right-turn-on-red 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 (PedVol) -- Signalized intersections only					140	
Maximum number of lanes crossed by a pedestrian (n_{lanesx})				--	7	
Number of bus stops within 300 m (1,000 ft) of the intersection				0	3	
Schools within 300 m (1,000 ft) of the intersection (present/not present)				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)
0.81	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**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	13.721	1.000	13.721	0.67	1.00	9.142
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	4.884	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.368	5.049	0.67	1.00	3.364
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	8.389	$(5)_{TOTAL}-(5)_{FI}$ = 0.632	8.673	0.67	1.00	5.779

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	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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.199	0.118	0.67	1.00	0.078
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.482	$(5)_{TOTAL}-(5)_{FI}$ = 0.801	0.475	0.67	1.00	0.317

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	0.078	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 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}	
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 factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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)	--	--	--	--	--	--	--	--	1.00	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

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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 Urban and Suburban Arterial Intersections						
General 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	
Input Data				**Base Conditions**	**Site Conditions**	
Intersection type (3ST, 3SG, 4ST, 4SG)				--	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-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	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-red 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 (PedVol) -- Signalized intersections only					140	
Maximum number of lanes crossed by a pedestrian (n_{lanesx})				--	9	
Number of bus stops within 300 m (1,000 ft) of the intersection				0	0	
Schools within 300 m (1,000 ft) of the intersection (present/not present)				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	0.78	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	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.357	4.684	0.40	1.00	1.867
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	8.154	$(5)_{TOTAL}-(5)_{FI}$ 0.643	8.426	0.40	1.00	3.358

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	1.867	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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.215	0.135	0.40	1.00	0.054
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.495	$(5)_{TOTAL}-(5)_{FI}$ 0.785	0.494	0.40	1.00	0.197

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	0.054	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)	(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 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}	
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 Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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)	(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	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

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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 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

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections						
General 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	
Input 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 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 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 applicable)				--	Permissive	
Number of approaches with right-turn-on-red 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 (PedVol) -- Signalized intersections only					164	
Maximum number of lanes crossed by a pedestrian (n_{lanesx})				--	7	
Number of bus stops within 300 m (1,000 ft) of the intersection				0	4	
Schools within 300 m (1,000 ft) of the intersection (present/not present)				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	0.83	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 Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	6.492	1.000	6.492	0.46	1.00	2.987
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	2.073	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.331	2.149	0.46	1.00	0.989
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	4.191	$(5)_{TOTAL}-(5)_{FI}$ 0.669	4.344	0.46	1.00	1.998

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	0.989	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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.21	0.68	0.27	0.36	0.414	1.000	0.414	0.46	1.00	0.190
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.106	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.261	0.108	0.46	1.00	0.050
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.302	$(5)_{TOTAL}-(5)_{FI}$ 0.739	0.306	0.46	1.00	0.141

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	0.141	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}**	**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 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}	
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 factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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)	(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	2.987	0.190	3.177	0.015	0.048
Fatal and injury (FI)	--	--	--	--	0.048

* 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; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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 Information and Input Data for Urban and Suburban 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	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)	$AADT_{MAX}$ = 66,000 (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 Present, 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 Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.294	0.008	1.08	1.00	0.008
Property Damage Only (PDO)	-12.81	1.38	1.34	0.020	$(5)_{TOTAL}-(5)_{FI}$ = 0.706	0.019	1.08	1.00	0.020

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	0.008	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)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.152	0.002	1.08	1.00	0.002
Property Damage Only (PDO)	-5.04	0.45	1.06	0.008	$(5)_{TOTAL}-(5)_{FI}$ = 0.848	0.009	1.08	1.00	0.009

Worksheet 1F -- Single-Vehicle 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 $_{brsv\ (FI)}$ (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

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		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	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_r**	**Predicted N_{brdwy}**
	$(5)_{TOTAL}$ from Worksheet 1G	from Table 12-7	$(2)_{TOTAL}$ * (3)	(6) from Worksheet 1B		(4)*(5)*(6)
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)*
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	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)*
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	0.029	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

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (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
Driveway-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

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

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections						
General Information					**Location 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 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		
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 applicable)				--		
Number of approaches with right-turn-on-red prohibited [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 intersection				0		
Schools within 300 m (1,000 ft) of the intersection (present/not present)				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 Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-8.90	0.82	0.25	0.40	2.160	1.000	2.160	0.89	1.00	1.915
Fatal and Injury (FI)	-11.13	0.93	0.28	0.48	0.826	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.379	0.819	0.89	1.00	0.726
Property Damage Only (PDO)	-8.74	0.77	0.23	0.40	1.352	$(5)_{TOTAL}-(5)_{FI}$ 0.621	1.341	0.89	1.00	1.189

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	0.726	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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.288	0.080	0.89	1.00	0.071
Property Damage Only (PDO)	-7.04	0.36	0.25	0.54	0.192	$(5)_{TOTAL}-(5)_{FI}$ 0.712	0.198	0.89	1.00	0.175

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	0.071	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)	(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	1.915	0.247	2.161	0.022	0.048
Fatal 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 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}	
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 Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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}**
	(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

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; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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 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	2.2
Fatal and injury (FI)	0.9
Property damage only (PDO)	1.4

Worksheet 1A -- General Information and Input Data for Urban and Suburban 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	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 Present, 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 Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-12.34	1.36	1.32	3.938	1.000	3.938	1.08	1.00	4.243
Fatal and Injury (FI)	-12.76	1.28	1.31	1.102	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.266	1.046	1.08	1.00	1.127
Property Damage Only (PDO)	-12.81	1.38	1.34	3.047	$(5)_{TOTAL}-(5)_{FI}$ = 0.734	2.892	1.08	1.00	3.116

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	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

Worksheet 1E -- Single-Vehicle 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 Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.193	0.084	1.08	1.00	0.090
Property Damage Only (PDO)	-5.04	0.45	1.06	0.354	$(5)_{TOTAL}-(5)_{FI}$ = 0.807	0.350	1.08	1.00	0.377

Worksheet 1F -- Single-Vehicle 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 $_{brsv\ (FI)}$ (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	0.377	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

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		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	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_r**	**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)*
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	4.243	0.468	0.000	4.711	0.019	0.090
Fatal 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)*
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	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

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J
MULTIPLE-VEHICLE			
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	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

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections						
General 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)				--	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 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 applicable)				--	Not Applicable	
Number of approaches with right-turn-on-red prohibited [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) -- Signalized intersections only					6	
Maximum number of lanes crossed by a pedestrian (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 intersection (present/not present)				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)
0.86	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	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-12.13	1.11	0.26	0.33	14.682	1.000	14.682	0.66	1.00	9.665
Fatal and Injury (FI)	-11.58	1.02	0.17	0.30	4.015	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.290	4.257	0.66	1.00	2.802
Property Damage Only (PDO)	-13.24	1.14	0.30	0.36	9.833	$(5)_{TOTAL}-(5)_{FI}$ 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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.270	0.150	0.66	1.00	0.099
Property Damage Only (PDO)	-9.08	0.45	0.33	0.53	0.379	$(5)_{TOTAL}-(5)_{FI}$ 0.730	0.404	0.66	1.00	0.266

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	0.099	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)	(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 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}	
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 factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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)	(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	9.665	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

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; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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 Data for Urban and Suburban Roadway Segments

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		--	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 Present, 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 Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.317	0.125	1.35	1.00	0.169
Property Damage Only (PDO)	-12.53	1.38	1.08	0.257	$(5)_{TOTAL}-(5)_{FI}$ = 0.683	0.271	1.35	1.00	0.365

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	0.169	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)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.264	0.030	1.35	1.00	0.041
Property Damage Only (PDO)	-8.50	0.84	0.97	0.091	$(5)_{TOTAL}-(5)_{FI}$ = 0.736	0.085	1.35	1.00	0.114

Worksheet 1F -- Single-Vehicle 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 $_{brsv\ (FI)}$ (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

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		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	0.182	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_r**	**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)*
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	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)*
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	0.535	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

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J
MULTIPLE-VEHICLE			
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
Driveway-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
Total	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

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections						
General Information				**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 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	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 applicable)				--	Permissive	
Number of approaches with right-turn-on-red 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 (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 intersection				0	4	
Schools within 300 m (1,000 ft) of the intersection (present/not present)				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)
0.90	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	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	3.048	1.000	3.048	0.74	1.00	2.254
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	0.912	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.311	0.947	0.74	1.00	0.700
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	2.023	$(5)_{TOTAL}-(5)_{FI}$ = 0.689	2.101	0.74	1.00	1.554

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	0.700	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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.21	0.68	0.27	0.36	0.244	1.000	0.244	0.74	1.00	0.181
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.073	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.302	0.074	0.74	1.00	0.055
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.169	$(5)_{TOTAL}-(5)_{FI}$ = 0.698	0.171	0.74	1.00	0.126

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	0.055	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 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}	
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 factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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

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; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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 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

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections						
General 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	
				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)	--	11,281	
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 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 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 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 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 intersection				0	10	
Schools within 300 m (1,000 ft) of the intersection (present/not present)				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	0.78	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	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	8.503	1.000	8.503	0.40	1.00	3.389
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	2.791	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.340	2.890	0.40	1.00	1.152
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	5.422	$(5)_{TOTAL}-(5)_{FI}$ 0.660	5.614	0.40	1.00	2.238

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	1.152	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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.244	0.120	0.40	1.00	0.048
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.368	$(5)_{TOTAL}-(5)_{FI}$ 0.756	0.372	0.40	1.00	0.148

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	0.048	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)	(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 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}	
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 factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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)	(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	3.389	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

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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 Information and Input Data for Urban and Suburban 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 Present, 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

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 Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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

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	0.016	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)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.154	0.003	0.92	1.00	0.003
Property Damage Only (PDO)	-5.04	0.45	1.06	0.018	$(5)_{TOTAL}-(5)_{FI}$ = 0.846	0.018	0.92	1.00	0.016

Worksheet 1F -- Single-Vehicle 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 $_{brsv\ (FI)}$ (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

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		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	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_r**	**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)*
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	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)*
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	0.055	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

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 1D)	0.013	0.026	0.039
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
Driveway-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
Total	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 Urban and Suburban Arterial Intersections

General Information		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

Input 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-turn 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 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 applicable)		--	
Number of approaches with right-turn-on-red prohibited [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 intersection		0	
Schools within 300 m (1,000 ft) of the intersection (present/not present)		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)
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	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-13.36	1.11	0.41	0.80	1.580	1.000	1.580	0.61	1.00	0.965
Fatal and Injury (FI)	-14.01	1.16	0.30	0.69	0.526	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.319	0.504	0.61	1.00	0.308
Property Damage Only (PDO)	-15.38	1.20	0.51	0.77	1.121	$(5)_{TOTAL}-(5)_{FI}$ 0.681	1.075	0.61	1.00	0.657

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	0.308	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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.310	0.108	0.61	1.00	0.066
Property Damage Only (PDO)	-8.36	0.25	0.55	1.29	0.239	$(5)_{TOTAL}-(5)_{FI}$ 0.690	0.240	0.61	1.00	0.147

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	0.066	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)	(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	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 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}	
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 Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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}**
	(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

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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 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 Information and Input Data for Urban and Suburban 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	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 Present, 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

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 Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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

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	0.095	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)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.154	0.019	0.91	1.00	0.018
Property Damage Only (PDO)	-5.04	0.45	1.06	0.105	$(5)_{TOTAL}-(5)_{FI}$ = 0.846	0.106	0.91	1.00	0.097

Worksheet 1F -- Single-Vehicle 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 $_{brsv\ (FI)}$ (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

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		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	0.014	
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_r**	**Predicted N_{brdwy}**
	$(5)_{TOTAL}$ from Worksheet 1G	from Table 12-7	$(2)_{TOTAL}$ * (3)	(6) from Worksheet 1B		(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)*
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	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)*
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	0.327	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

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 1D)	0.079	0.153	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	0.056
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	0.243	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
Total	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

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections						
General Information					**Location 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 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:				--	--	
				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 applicable)				--		
Number of approaches with right-turn-on-red prohibited [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 intersection				0		
Schools within 300 m (1,000 ft) of the intersection (present/not present)				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	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	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-13.36	1.11	0.41	0.80	1.366	1.000	1.366	0.91	1.00	1.245
Fatal and Injury (FI)	-14.01	1.16	0.30	0.69	0.474	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.337	0.460	0.91	1.00	0.419
Property Damage Only (PDO)	-15.38	1.20	0.51	0.77	0.935	$(5)_{TOTAL}-(5)_{FI}$ = 0.663	0.906	0.91	1.00	0.826

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	0.419	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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-6.81	0.16	0.51	1.14	0.288	1.000	0.288	0.91	1.00	0.262
Fatal and Injury (FI)	--	--	--	--	0.089	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.314	0.090	0.91	1.00	0.082
Property Damage Only (PDO)	-8.36	0.25	0.55	1.29	0.195	$(5)_{TOTAL}-(5)_{FI}$ = 0.686	0.198	0.91	1.00	0.180

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	0.082	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 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}	
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 Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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}**
	(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)	--	--	--	--	0.024

* 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)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections						
General Information				**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 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 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]				--	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 applicable)				--	Permissive	
Number of approaches with right-turn-on-red 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 (PedVol) -- Signalized intersections only					129	
Maximum number of lanes crossed by a pedestrian (n_{lanesx})				--	7	
Number of bus stops within 300 m (1,000 ft) of the intersection				0	4	
Schools within 300 m (1,000 ft) of the intersection (present/not present)				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	0.92	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	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	9.087	1.000	9.087	0.49	1.00	4.452
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	2.996	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.341	3.100	0.49	1.00	1.519
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	5.785	$(5)_{TOTAL}-(5)_{FI}$ 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)**	**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	1.519	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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.21	0.68	0.27	0.36	0.517	1.000	0.517	0.49	1.00	0.253
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.124	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.242	0.125	0.49	1.00	0.061
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.388	$(5)_{TOTAL}-(5)_{FI}$ 0.758	0.392	0.49	1.00	0.192

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	0.061	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)	(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 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}	
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 factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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)	(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)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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

Worksheet 1A -- General Information and Input Data for Urban and Suburban Roadway Segments

General Information		Location Information	
Analyst	TL	Roadway	W. Gude Drive
Agency or Company	ATCS	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)	$AADT_{MAX}$ = 66,000 (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 Present, 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	1.18	1.01	0.91	1.00	1.09

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 Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ / 0.270	0.108	1.09	1.00	0.117
Property Damage Only (PDO)	-12.81	1.38	1.34	0.308	$(5)_{TOTAL}-(5)_{FI}$ / 0.730	0.292	1.09	1.00	0.317

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	0.117	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)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.187	0.010	1.09	1.00	0.011
Property Damage Only (PDO)	-5.04	0.45	1.06	0.043	$(5)_{TOTAL}-(5)_{FI}$ = 0.813	0.043	1.09	1.00	0.047

Worksheet 1F -- Single-Vehicle 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 $_{brsv\ (FI)}$ (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	0.011	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

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		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	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_r**	**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)*
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	0.434	0.057	0.000	0.491	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)*
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	0.434	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

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 1D)	0.097	0.210	0.307
Head-on collisions (from Worksheet 1D)	0.002	0.002	0.005
Angle 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
Driveway-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
Total	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

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections						
General Information				**Location 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 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 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				--	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 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 intersection				0	0	
Schools within 300 m (1,000 ft) of the intersection (present/not present)				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	0.78	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 Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	12.428	1.000	12.428	0.42	1.00	5.160
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	4.185	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.348	4.322	0.42	1.00	1.794
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	7.850	$(5)_{TOTAL}-(5)_{FI}$ 0.652	8.107	0.42	1.00	3.366

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	1.794	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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.21	0.68	0.27	0.36	0.658	1.000	0.658	0.42	1.00	0.273
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.150	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.230	0.151	0.42	1.00	0.063
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.501	$(5)_{TOTAL}-(5)_{FI}$ 0.770	0.506	0.42	1.00	0.210

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	0.063	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)	(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 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}	
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 Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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)	(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	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

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; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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 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 Information and Input Data for Urban and Suburban 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 Present, 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)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.267	0.085	1.19	1.00	0.101
Property Damage Only (PDO)	-12.81	1.38	1.34	0.245	$(5)_{TOTAL}-(5)_{FI}$ = 0.733	0.233	1.19	1.00	0.276

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	0.101	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)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.191	0.007	1.19	1.00	0.008
Property Damage Only (PDO)	-5.04	0.45	1.06	0.030	$(5)_{TOTAL}-(5)_{FI}$ = 0.809	0.030	1.19	1.00	0.036

Worksheet 1F -- Single-Vehicle 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 $_{brsv\ (FI)}$ (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

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		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	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_r**	**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)*
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	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)*
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	0.377	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

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (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
Driveway-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

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections						
General Information				**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 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 (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 applicable)				--	Not Applicable	
Number of approaches with right-turn-on-red 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 (PedVol) -- Signalized intersections only					231	
Maximum number of lanes crossed by a pedestrian (n_{lanesx})				--	5	
Number of bus stops within 300 m (1,000 ft) of the intersection				0	2	
Schools within 300 m (1,000 ft) of the intersection (present/not present)				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)
0.86	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	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-12.13	1.11	0.26	0.33	5.226	1.000	5.226	0.71	1.00	3.697
Fatal and Injury (FI)	-11.58	1.02	0.17	0.30	1.599	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.323	1.686	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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-9.02	0.42	0.40	0.36	0.331	1.000	0.331	0.71	1.00	0.234
Fatal and Injury (FI)	-9.75	0.27	0.51	0.24	0.091	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.286	0.095	0.71	1.00	0.067
Property Damage Only (PDO)	-9.08	0.45	0.33	0.53	0.227	$(5)_{TOTAL}-(5)_{FI}$ = 0.714	0.237	0.71	1.00	0.167

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	0.067	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)	(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 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}	
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 Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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)	(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	3.697	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

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; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections						
General 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	
Input 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 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	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 (if applicable)				--	Permissive	
Number of approaches with right-turn-on-red 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 (PedVol) -- Signalized intersections only					54	
Maximum number of lanes crossed by a pedestrian (n_{lanesx})				--	5	
Number of bus stops within 300 m (1,000 ft) of the intersection				0	2	
Schools within 300 m (1,000 ft) of the intersection (present/not present)				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	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	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	4.050	1.000	4.050	0.60	1.00	2.435
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	1.267	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.325	1.318	0.60	1.00	0.792
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	2.627	$(5)_{TOTAL}-(5)_{FI}$ 0.675	2.732	0.60	1.00	1.642

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	0.792	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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.272	0.075	0.60	1.00	0.045
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.200	$(5)_{TOTAL}-(5)_{FI}$ 0.728	0.201	0.60	1.00	0.121

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	0.045	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)	(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 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}	
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 Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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)	(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	2.435	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

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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
Total	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 Information and Input Data for Urban and Suburban 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 Present, 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

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 Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.284	0.021	1.05	1.00	0.023
Property Damage Only (PDO)	-12.81	1.38	1.34	0.057	$(5)_{TOTAL}-(5)_{FI}$ = 0.716	0.054	1.05	1.00	0.057

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	0.023	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

Worksheet 1E -- Single-Vehicle 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 Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.165	0.003	1.05	1.00	0.003
Property Damage Only (PDO)	-5.04	0.45	1.06	0.016	$(5)_{TOTAL}-(5)_{FI}$ = 0.835	0.016	1.05	1.00	0.017

Worksheet 1F -- Single-Vehicle 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 $_{brsv\ (FI)}$ (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	0.017	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

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		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	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_r**	**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)*
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	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)*
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	0.079	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

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J
MULTIPLE-VEHICLE			
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
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	0.023	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

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	3.6
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 Urban and Suburban Arterial Intersections						
General 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	
Input Data				**Base Conditions**	**Site Conditions**	
Intersection type (3ST, 3SG, 4ST, 4SG)				--	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-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 (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-red 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 (PedVol) -- Signalized intersections only					54	
Maximum number of lanes crossed by a pedestrian (n_{lanesx})				--	5	
Number of bus stops within 300 m (1,000 ft) of the intersection				0	3	
Schools within 300 m (1,000 ft) of the intersection (present/not present)				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)
0.81	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	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	6.805	1.000	6.805	0.65	1.00	4.436
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	2.198	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.335	2.278	0.65	1.00	1.485
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	4.367	$(5)_{TOTAL}-(5)_{FI}$ 0.665	4.527	0.65	1.00	2.951

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	1.485	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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.254	0.106	0.65	1.00	0.069
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.308	$(5)_{TOTAL}-(5)_{FI}$ 0.746	0.311	0.65	1.00	0.203

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	0.069	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}**
	(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 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}	
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 factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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}**
	(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

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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 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	4.9
Fatal and injury (FI)	1.7
Property damage only (PDO)	3.2

Worksheet 1A -- General Information and Input Data for Urban and Suburban 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 Present, 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)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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

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	0.041	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

Worksheet 1E -- Single-Vehicle 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 Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.168	0.006	0.98	1.00	0.005
Property Damage Only (PDO)	-5.04	0.45	1.06	0.027	$(5)_{TOTAL}-(5)_{FI}$ = 0.832	0.027	0.98	1.00	0.027

Worksheet 1F -- Single-Vehicle 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 $_{brsv\ (FI)}$ (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	0.027	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

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		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	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_r**	**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)*
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	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

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (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
Driveway-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	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)**
	(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 Urban and Suburban Arterial Intersections						
General 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	
Input 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 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 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	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-red 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 (PedVol) -- Signalized intersections only					54	
Maximum number of lanes crossed by a pedestrian (n_{lanesx})				--	5	
Number of bus stops within 300 m (1,000 ft) of the intersection				0	6	
Schools within 300 m (1,000 ft) of the intersection (present/not present)				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)
0.73	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	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	5.623	1.000	5.623	0.58	1.00	3.276
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	1.757	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.324	1.820	0.58	1.00	1.061
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	3.671	$(5)_{TOTAL}-(5)_{FI}$ 0.676	3.803	0.58	1.00	2.216

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	1.061	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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.21	0.68	0.27	0.36	0.388	1.000	0.388	0.58	1.00	0.226
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.105	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.275	0.106	0.58	1.00	0.062
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.277	$(5)_{TOTAL}-(5)_{FI}$ 0.725	0.281	0.58	1.00	0.164

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	0.062	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}**
	(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 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}	
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 factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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}**
	(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

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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 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	3.7
Fatal and injury (FI)	1.3
Property damage only (PDO)	2.4

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections						
General Information				**Location 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 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	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 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 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 intersection				0	2	
Schools within 300 m (1,000 ft) of the intersection (present/not present)				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)
0.73	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)			(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}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	7.728	1.000	7.728	0.51	1.00	3.976
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	2.468	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.330	2.553	0.51	1.00	1.314
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	5.004	$(5)_{TOTAL}-(5)_{FI}$ 0.670	5.176	0.51	1.00	2.663

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	1.314	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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.261	0.129	0.51	1.00	0.066
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.358	$(5)_{TOTAL}-(5)_{FI}$ 0.739	0.365	0.51	1.00	0.188

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	0.066	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 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 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}	
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 Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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

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	3.976	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

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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 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	4.4
Fatal and injury (FI)	1.6
Property damage only (PDO)	2.9

Worksheet 1A -- General Information and Input Data for Urban and Suburban Roadway Segments

General Information		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 Present, 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

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 Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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

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	0.110	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)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.171	0.013	1.08	1.00	0.014
Property Damage Only (PDO)	-5.04	0.45	1.06	0.063	$(5)_{TOTAL}-(5)_{FI}$ = 0.829	0.063	1.08	1.00	0.068

Worksheet 1F -- Single-Vehicle 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 $_{brsv\ (FI)}$ (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	0.068	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

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		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	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_r**	**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)*
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	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)*
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	0.395	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

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (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
Driveway-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 Urban and Suburban Arterial Intersections						
General 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	
Input 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 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 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]				--	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-red 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 (PedVol) -- Signalized intersections only					122	
Maximum number of lanes crossed by a pedestrian (n_{lanesx})				--	5	
Number of bus stops within 300 m (1,000 ft) of the intersection				0	0	
Schools within 300 m (1,000 ft) of the intersection (present/not present)				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	0.78	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	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	8.695	1.000	8.695	0.43	1.00	3.761
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	2.829	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.337	2.926	0.43	1.00	1.265
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	5.577	$(5)_{TOTAL}-(5)_{FI}$ 0.663	5.769	0.43	1.00	2.495

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	1.265	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-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 Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.21	0.68	0.27	0.36	0.520	1.000	0.520	0.43	1.00	0.225
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.128	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.250	0.130	0.43	1.00	0.056
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.384	$(5)_{TOTAL}-(5)_{FI}$ 0.750	0.390	0.43	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	0.056	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}**
	(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 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}	
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 Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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}**
	(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

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; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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 and Input Data for Urban and Suburban Roadway Segments

General Information		Location 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 Present, 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 Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
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	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.271	0.202	1.06	1.00	0.215
Property Damage Only (PDO)	-12.81	1.38	1.34	0.575	$(5)_{TOTAL}-(5)_{FI}$ = 0.729	0.545	1.06	1.00	0.579

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	0.215	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)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-5.05	0.47	0.86	0.103	1.000	0.103	1.06	1.00	0.109
Fatal and Injury (FI)	-8.71	0.66	0.28	0.019	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.185	0.019	1.06	1.00	0.020
Property Damage Only (PDO)	-5.04	0.45	1.06	0.084	$(5)_{TOTAL}-(5)_{FI}$ = 0.815	0.084	1.06	1.00	0.089

Worksheet 1F -- Single-Vehicle 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 $_{brsv\ (FI)}$ (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

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		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	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)
Crash Severity Level	**Initial N_{brdwy}**	**Proportion of total crashes (f_{dwy})**	**Adjusted N_{brdwy}**	**Combined CMFs**	**Calibration factor, C_r**	**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)*
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	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)*
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	0.793	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

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (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
Driveway-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

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	0.12	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 Urban and Suburban Arterial Intersections						
General 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	
Input Data				**Base Conditions**	**Site Conditions**	
Intersection type (3ST, 3SG, 4ST, 4SG)				--	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 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	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-red 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 (PedVol) -- Signalized intersections only					122	
Maximum number of lanes crossed by a pedestrian (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 intersection (present/not present)				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	0.91	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**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	6.635	1.000	6.635	0.47	1.00	3.090
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	2.166	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.339	2.247	0.47	1.00	1.046
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	4.228	$(5)_{TOTAL}-(5)_{FI}$ 0.661	4.388	0.47	1.00	2.043

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	1.046	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)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
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	0.29	0.09	0.096	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.247	0.096	0.47	1.00	0.045
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.292	$(5)_{TOTAL}-(5)_{FI}$ 0.753	0.294	0.47	1.00	0.137

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	0.045	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)*
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 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}	
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 Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
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)*
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	3.090	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

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; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (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 One-Way Urban and Suburban Arterials using NCHRP Report 17-58

for the

No Build Scenario

Safety Prediction Worksheet for Two-Way Urban and Suburban Arterial Segments

General Information

Analyst	PC
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Street number	CO-166
Street name	Democracy Blvd from Taveshire
Segment number	1
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	0.674	0.933	1.607
Multiple-vehicle crashes	0.437	0.679	
Single-vehicle crashes	0.201	0.254	
Vehicle-pedestrian crashes	0.024		
Vehicle-bicycle crashes	0.013		

Combined CMF

	F+I	PDO
Multiple-vehicle crashes	0.685	0.685
Single-vehicle crashes	2.266	2.266

Severity distribution for F+I crashes

K	A	B	C
0.008	0.053	0.207	0.405

Input Data		Value	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		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		5	**38 objects per mile.**
Average roadside fixed object offset, ft		7	.

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	Single	Multiple	Single
Lane width	1.045	1.045	1.045	1.045
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 crossing	1.000	1.000	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	1.000	1.000	1.000	1.000
Roadside fixed objects		1.154		1.154

Safety Prediction Worksheet for Two-Way Urban and Suburban Arterial Segments

General Information

Analyst	PC
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Street number	CO-166
Street name	Democracy Blvd from I-270 On-R
Segment number	2
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	1.823	2.499	4.322
Multiple-vehicle crashes	1.062	1.662	
Single-vehicle crashes	0.664	0.838	
Vehicle-pedestrian crashes	0.063		
Vehicle-bicycle crashes	0.034		

Combined CMF

	F+I	PDO
Multiple-vehicle crashes	0.527	0.527
Single-vehicle crashes	2.299	2.299

Severity distribution for F+I crashes

K	A	B	C
0.022	0.144	0.561	1.095

Input Data		Value	Advisory Messages
Basic Roadway Data			
Area type		Suburban	.
Segment type		6D	.
Segment length, mi		0.43	.
Annual average daily traffic (AADT), veh/day		38902	.
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	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 fixed object count		24	**56 objects per mile.**
Average roadside fixed object offset, ft		7	.

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	Single	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 crossing	1.000	1.000	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	1.000	1.000	1.000
Roadside fixed objects		1.223		1.223

Safety Prediction Worksheet for Urban and Suburban Arterial Intersections

General Information

Analyst	PC
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Major street name	Democracy Blvd
Minor street name	Taveshire Way
Intersection number	1
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	2.365	2.136	4.501
Total-vehicle crashes	2.217	2.136	
Vehicle-pedestrian crashes	0.022		
Vehicle-bicycle crashes	0.126		

Combined CMF

	F+I	PDO
Total-vehicle crashes	0.723	0.723
Vehicle-pedestrian crashes	1.000	

Severity distribution for F+I crashes

K	A	B	C
0.014	0.131	0.659	1.562

Input Data

Input Data	Value	Advisory Messages
Intersection Data		
Area type	Suburban	.
Number of legs	3	3SG intersection type
Traffic control type	Signalized	.
Lighting present?	Yes	.
Red-light cameras present?	No	.
Daily pedestrian volume crossing all legs (peds/day)	166	.
Maximum number of lanes crossed by a pedestrian	8	.
Number of bus stops within 1,000 ft of intersection	0	.
School(s) present within 1,000 ft of intersection?	No	.
Alcohol sales establishments within 1,000 ft	0	.

Street Data	Major	Minor	
Street configuration	Two-way	Two-way	2x2 intersection configuration
Annual average daily traffic (AADT), veh/day	40795	4075	.
Number of through lanes	6	4	.
Number of approaches with left-turn lanes	0	1	.
Number of left-turn movements with protected phasing	0	1	.
Number of right-turn movements prohibited on red	0	0	.
Number of U-turn movements prohibited	2	1	.
Number of approaches with right-turn channelization	0	0	.

Calibration Factors

Calibration Factors	Value	Default Values
Local calibration factor (C)	1.000	1.000
Adjustment factor for pedestrians for stop control (f_{ped})	0.051	0.051
Adjustment factor for bicyclists (f_{bike})	0.029	0.029
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

Manner of Collision Proportions

2x2 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.094	0.154	0.120	0.189	0.079	0.098	0.083	0.148
Angle colllision proportion	0.764	0.629	0.676	0.554	0.806	0.707	0.746	0.552

1x2 or 1x1 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.100	0.100	0.111	0.143	0.047	0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.571	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	0.860	0.860
Right-turn-on-red	1.000	1.000
U-turn prohibition	0.885	0.885
Right-turn channelization	1.000	1.000
Number of lanes	1.043	1.043
Vehicle-pedestrian crash CMFs		
Bus stops	1.000	
Schools	1.000	
Alcohol sales establishments	1.000	

Safety Prediction Worksheet for Urban and Suburban Arterial Intersections

General Information

Analyst	PC
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Major street name	Democracy Blvd
Minor street name	Fernwood Road
Intersection number	2
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	4.243	3.552	7.795
Total-vehicle crashes	3.782	3.552	
Vehicle-pedestrian crashes	0.321		
Vehicle-bicycle crashes	0.139		

Combined CMF

	F+I	PDO
Total-vehicle crashes	0.752	0.752
Vehicle-pedestrian crashes	4.150	

Severity distribution for F+I crashes

K	A	B	C
0.023	0.224	1.122	2.874

Input Data	*Value*	*Advisory Messages*
Intersection Data		
Area type	Suburban	.
Number of legs	4	4SG intersection type
Traffic control type	Signalized	.
Lighting present?	Yes	.
Red-light cameras present?	Yes	.
Daily pedestrian volume crossing all legs (peds/day)	328	.
Maximum number of lanes crossed by a pedestrian	8	.
Number of bus stops within 1,000 ft of intersection	2	.
School(s) present within 1,000 ft of intersection?	No	.
Alcohol sales establishments within 1,000 ft	0	.

Street Data	*Major*	*Minor*	.
Street configuration	Two-way	Two-way	2x2 intersection configuration
Annual average daily traffic (AADT), veh/day	28351	12852	.
Number of through lanes	6	4	.
Number of approaches with left-turn lanes	2	2	.
Number of left-turn movements with protected phasing	2	2	.
Number of right-turn movements prohibited on red	0	0	.
Number of U-turn movements prohibited	0	0	.
Number of approaches with right-turn channelization	2	2	.

Calibration Factors	*Value*	*Default Values*
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

Manner of Collision Proportions

2x2 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.094	0.154	0.120	0.189	0.079	0.098	0.083	0.148
Angle colllision proportion	0.764	0.629	0.676	0.554	0.806	0.707	0.746	0.552
1x2 or 1x1 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.100	0.100	0.111	0.143	0.047	0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.571	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	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 CMFs		
Bus stops	4.150	
Schools	1.000	
Alcohol sales establishments	1.000	

Safety Prediction Worksheet for Urban and Suburban Arterial Intersections

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Major street name	MD 187 Old Georgetown Rd
Minor street name	Lone Oak Way/Manor Oak Way
Intersection number	1
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	4.450	3.578	8.027
Total-vehicle crashes	4.018	3.578	
Vehicle-pedestrian crashes	0.288		
Vehicle-bicycle crashes	0.144		

Combined CMF

	F+I	PDO
Total-vehicle crashes	0.911	0.911
Vehicle-pedestrian crashes	5.603	

Severity distribution for F+I crashes

K	A	B	C
0.024	0.235	1.176	3.014

Input Data

Input Data	Value	Advisory Messages
Intersection Data		
Area type	Suburban	.
Number of legs	4	4SG intersection type
Traffic control type	Signalized	.
Lighting present?	Yes	.
Red-light cameras present?	No	.
Daily pedestrian volume crossing all legs (peds/day)	301	.
Maximum number of lanes crossed by a pedestrian	8	.
Number of bus stops within 1,000 ft of intersection	6	.
School(s) present within 1,000 ft of intersection?	Yes	.
Alcohol sales establishments within 1,000 ft	0	.

Street Data	Major	Minor	
Street configuration	Two-way	Two-way	2x2 intersection configuration
Annual average daily traffic (AADT), veh/day	51254	3590	.
Number of through lanes	6	2	.
Number of approaches with left-turn lanes	2	0	.
Number of left-turn movements with protected phasing	0	0	.
Number of right-turn movements prohibited on red	0	0	.
Number of U-turn movements prohibited	0	0	.
Number of approaches with right-turn channelization	0	0	.

Calibration Factors

Calibration Factors	Value	Default Values
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

Manner of Collision Proportions

2x2 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.094	0.154	0.120	0.189	0.079	0.098	0.083	0.148
Angle colllision proportion	0.764	0.629	0.676	0.554	0.806	0.707	0.746	0.552

1x2 or 1x1 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.100	0.100	0.111	0.143	0.047	0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.571	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	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		
Bus stops	4.150	
Schools	1.350	
Alcohol sales establishments	1.000	

Safety Prediction Worksheet for Two-Way Urban and Suburban Arterial Segments

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Street number	MD 187
Street name	Lone Oak Way/Manor Oak Way t
Segment number	1
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	1.420	1.897	3.317
Multiple-vehicle crashes	0.920	1.365	
Single-vehicle crashes	0.425	0.532	
Vehicle-pedestrian crashes	0.049		
Vehicle-bicycle crashes	0.026		

Combined CMF

	F+I	PDO
Multiple-vehicle crashes	0.569	0.569
Single-vehicle crashes	2.308	2.308

Severity distribution for F+I crashes

K	A	B	C
0.017	0.112	0.437	0.853

Input Data		*Value*	*Advisory Messages*
Basic Roadway Data			
Area type		Suburban	.
Segment type		6D	.
Segment length, mi		0.24	.
Annual average daily traffic (AADT), veh/day		52101	.
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	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		8	.

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	*Single*	*Multiple*	*Single*
Lane width	1.022	1.022	1.022	1.022
Outside shoulder width	1.014	1.014	1.014	1.014
Median width	1.000	1.000	1.000	1.000
Median barrier	0.600	1.967	0.600	1.967
Highway-rail grade crossing	1.000	1.000	1.000	1.000
Major commercial driveways	0.932		0.932	
Major industrial driveways	0.989		0.989	
Minor driveways	0.991		0.991	
Automated speed enforcement	1.000	1.000	1.000	1.000
Roadside fixed objects		1.131		1.131

Safety Prediction Worksheet for Two-Way Urban and Suburban Arterial Segments

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Street number	MD 187
Street name	I-495 to Ryland Dr
Segment number	2
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	0.451	0.602	1.052
Multiple-vehicle crashes	0.270	0.405	
Single-vehicle crashes	0.157	0.197	
Vehicle-pedestrian crashes	0.015		
Vehicle-bicycle crashes	0.008		

Combined CMF

	F+I	PDO
Multiple-vehicle crashes	0.535	0.535
Single-vehicle crashes	2.614	2.614

Severity distribution for F+I crashes

K	A	B	C
0.005	0.036	0.139	0.271

Input Data		*Value*	*Advisory Messages*
Basic Roadway Data			
Area type		Suburban	.
Segment type		6D	.
Segment length, mi		0.08	.
Annual average daily traffic (AADT), veh/day		49489	.
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	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 fixed object count		9	**113 objects per mile.**
Average roadside fixed object offset, ft		10	.

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	*Single*	*Multiple*	*Single*
Lane width	1.022	1.022	1.022	1.022
Outside shoulder width	1.014	1.014	1.014	1.014
Median width	0.983	0.983	0.983	0.983
Median barrier	0.600	1.967	0.600	1.967
Highway-rail grade crossing	1.000	1.000	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
Roadside fixed objects		1.304		1.304

Safety Prediction Worksheet for Urban and Suburban Arterial Intersections

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Major street name	MD 187 Old Georgetown Rd
Minor street name	Ryland Dr
Intersection number	2
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	4.392	3.595	7.988
Total-vehicle crashes	4.025	3.595	
Vehicle-pedestrian crashes	0.223		
Vehicle-bicycle crashes	0.145		

Combined CMF

	F+I	PDO
Total-vehicle crashes	0.911	0.911
Vehicle-pedestrian crashes	5.603	

Severity distribution for F+I crashes

K	A	B	C
0.024	0.232	1.161	2.976

Input Data

Input Data	Value	Advisory Messages
Intersection Data		
Area type	Suburban	.
Number of legs	4	4SG intersection type
Traffic control type	Signalized	.
Lighting present?	Yes	.
Red-light cameras present?	No	.
Daily pedestrian volume crossing all legs (peds/day)	182	.
Maximum number of lanes crossed by a pedestrian	7	.
Number of bus stops within 1,000 ft of intersection	5	.
School(s) present within 1,000 ft of intersection?	Yes	.
Alcohol sales establishments within 1,000 ft	0	.

Street Data	Major	Minor	
Street configuration	Two-way	Two-way	2x2 intersection configuration
Annual average daily traffic (AADT), veh/day	49427	3792	.
Number of through lanes	6	2	.
Number of approaches with left-turn lanes	2	1	.
Number of left-turn movements with protected phasing	0	0	.
Number of right-turn movements prohibited on red	0	0	.
Number of U-turn movements prohibited	0	0	.
Number of approaches with right-turn channelization	0	0	.

Calibration Factors

Calibration Factors	Value	Default Values
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

Manner of Collision Proportions

2x2 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.094	0.154	0.120	0.189	0.079	0.098	0.083	0.148
Angle colllision proportion	0.764	0.629	0.676	0.554	0.806	0.707	0.746	0.552

1x2 or 1x1 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.100	0.100	0.111	0.143	0.047	0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.571	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	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		
Bus stops	4.150	
Schools	1.350	
Alcohol sales establishments	1.000	

Safety Prediction Worksheet for Two-Way Urban and Suburban Arterial Segments

General Information

Analyst	PC
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Street number	MD 187
Street name	Old Georgetown Rd from Rock S
Segment number	1
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	0.848	1.090	1.938
Multiple-vehicle crashes	0.364	0.539	
Single-vehicle crashes	0.440	0.551	
Vehicle-pedestrian crashes	0.028		
Vehicle-bicycle crashes	0.015		

Combined CMF

	F+I	PDO
Multiple-vehicle crashes	0.529	0.529
Single-vehicle crashes	5.686	5.686

Severity distribution for F+I crashes

K	A	B	C
0.013	0.067	0.260	0.508

Input Data		*Value*	*Advisory Messages*
Basic Roadway Data			
Area type		Suburban	.
Segment type		6D	.
Segment length, mi		0.1	.
Annual average daily traffic (AADT), veh/day		53058	.
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	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 objects per mile.**
Average roadside fixed object offset, ft		3	.

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	*Single*	*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 crossing	1.000	1.000	1.000	1.000
Major commercial driveways	0.932		0.932	
Major industrial driveways	0.989		0.989	
Minor driveways	1.000		1.000	
Automated speed enforcement	1.000	1.000	1.000	1.000
Roadside fixed objects		3.025		3.025

Safety Prediction Worksheet for Two-Way Urban and Suburban Arterial Segments

General Information

Analyst	PC
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Street number	MD 187
Street name	Old Georgetown Rd from I-270 N
Segment number	2
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	1.056	1.366	2.422
Multiple-vehicle crashes	0.543	0.793	
Single-vehicle crashes	0.459	0.573	
Vehicle-pedestrian crashes	0.036		
Vehicle-bicycle crashes	0.019		

Combined CMF

	F+I	PDO
Multiple-vehicle crashes	0.515	0.515
Single-vehicle crashes	4.098	4.098

Severity distribution for F+I crashes

K	A	B	C
0.016	0.083	0.324	0.633

Input Data		Value	Advisory Messages
Basic Roadway Data			
Area type		Suburban	.
Segment type		6D	.
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 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			
Roadside fixed object count		25	**179 objects per mile.**
Average roadside fixed object offset, ft		3	.

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	Single	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	0.945	0.945	0.945	0.945
Median barrier	0.600	1.967	0.600	1.967
Highway-rail grade crossing	1.000	1.000	1.000	1.000
Major commercial driveways	0.932		0.932	
Major industrial driveways	0.989		0.989	
Minor driveways	0.985		0.985	
Automated speed enforcement	1.000	1.000	1.000	1.000
Roadside fixed objects		2.205		2.205

Safety Prediction Worksheet for Urban and Suburban Arterial Intersections

General Information

Analyst	PC
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Major street name	MD 187 (Old Georgetown Rd)
Minor street name	Rock Spring Dr
Intersection number	4
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	4.921	3.792	8.713
Total-vehicle crashes	4.264	3.792	
Vehicle-pedestrian crashes	0.504		
Vehicle-bicycle crashes	0.153		

Combined CMF

	F+I	PDO
Total-vehicle crashes	0.619	0.619
Vehicle-pedestrian crashes	6.275	

Severity distribution for F+I crashes

K	A	B	C
0.027	0.260	1.301	3.334

Input Data

Input Data	Value		Advisory Messages
Intersection Data			
Area type	Suburban		.
Number of legs	4		4SG intersection type
Traffic control type	Signalized		.
Lighting present?	Yes		.
Red-light cameras present?	No		.
Daily pedestrian volume crossing all legs (peds/day)	256		.
Maximum number of lanes crossed by a pedestrian	8		.
Number of bus stops within 1,000 ft of intersection	2		.
School(s) present within 1,000 ft of intersection?	Yes		.
Alcohol sales establishments within 1,000 ft	2		.
Street Data	*Major*	*Minor*	.
Street configuration	Two-way	Two-way	2x2 intersection configuration
Annual average daily traffic (AADT), veh/day	52069	18297	.
Number of through lanes	6	2	.
Number of approaches with left-turn lanes	2	1	.
Number of left-turn movements with protected phasing	2	2	.
Number of right-turn movements prohibited on red	0	0	.
Number of U-turn movements prohibited	0	0	.
Number of approaches with right-turn channelization	1	0	.

Calibration Factors

Calibration Factors	Value	Default Values
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

Manner of Collision Proportions

2x2 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.094	0.154	0.120	0.189	0.079	0.098	0.083	0.148
Angle colllision proportion	0.764	0.629	0.676	0.554	0.806	0.707	0.746	0.552

1x2 or 1x1 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.100	0.100	0.111	0.143	0.047	0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.571	0.822	0.706	0.837	0.733

Crash Modification Factors

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	0.547	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		
Bus stops	4.150	
Schools	1.350	
Alcohol sales establishments	1.120	

Safety Prediction Worksheet for Urban and Suburban Arterial Intersections

General Information

Analyst	PC
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Major street name	MD 187 (Old Georgetown Rd)
Minor street name	Tuckerman Ln
Intersection number	7
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	5.420	4.180	9.600
Total-vehicle crashes	4.741	4.180	
Vehicle-pedestrian crashes	0.510		
Vehicle-bicycle crashes	0.169		

Combined CMF

	F+I	PDO
Total-vehicle crashes	0.640	0.640
Vehicle-pedestrian crashes	5.603	

Severity distribution for F+I crashes

K	A	B	C
0.030	0.286	1.433	3.672

Input Data

Input Data	Value	Advisory Messages
Intersection Data		
Area type	Suburban	.
Number of legs	4	4SG intersection type
Traffic control type	Signalized	.
Lighting present?	Yes	.
Red-light cameras present?	No	.
Daily pedestrian volume crossing all legs (peds/day)	327	.
Maximum number of lanes crossed by a pedestrian	7	.
Number of bus stops within 1,000 ft of intersection	5	.
School(s) present within 1,000 ft of intersection?	Yes	.
Alcohol sales establishments within 1,000 ft	0	.

Street Data	Major	Minor	
Street configuration	Two-way	Two-way	2x2 intersection configuration
Annual average daily traffic (AADT), veh/day	57200	21114	.
Number of through lanes	6	4	.
Number of approaches with left-turn lanes	2	2	.
Number of left-turn movements with protected phasing	1	2	.
Number of right-turn movements prohibited on red	0	1	.
Number of U-turn movements prohibited	0	0	.
Number of approaches with right-turn channelization	0	0	.

Calibration Factors

Calibration Factors	Value	Default Values
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

Manner of Collision Proportions

2x2 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.094	0.154	0.120	0.189	0.079	0.098	0.083	0.148
Angle colllision proportion	0.764	0.629	0.676	0.554	0.806	0.707	0.746	0.552

1x2 or 1x1 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.100	0.100	0.111	0.143	0.047	0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.571	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	0.636	0.636
Right-turn-on-red	0.980	0.980
U-turn prohibition	1.000	1.000
Right-turn channelization	1.000	1.000
Number of lanes	1.128	1.128
Vehicle-pedestrian crash CMFs		
Bus stops	4.150	
Schools	1.350	
Alcohol sales establishments	1.000	

Safety Prediction Worksheet for Urban and Suburban Arterial Intersections

General Information

Analyst	PC
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Major street name	MD 187 (Old Georgetown Rd)
Minor street name	I-270 SB Ramp Connector/I-270
Intersection number	5
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	#N/A	#N/A	#N/A
Total-vehicle crashes	#N/A	#N/A	
Vehicle-pedestrian crashes	0.014		
Vehicle-bicycle crashes	#N/A		

Combined CMF

	F+I	PDO
Total-vehicle crashes	1.126	1.126
Vehicle-pedestrian crashes	1.000	

Severity distribution for F+I crashes

K	A	B	C
#N/A	#N/A	#N/A	#N/A

Input Data

Input Data	Value	Advisory Messages
Intersection Data		
Area type	Suburban	.
Number of legs	3	3SG intersection type
Traffic control type	Signalized	.
Lighting present?	Yes	.
Red-light cameras present?	No	.
Daily pedestrian volume crossing all legs (peds/day)	52	.
Maximum number of lanes crossed by a pedestrian	6	.
Number of bus stops within 1,000 ft of intersection	0	.
School(s) present within 1,000 ft of intersection?	No	.
Alcohol sales establishments within 1,000 ft	0	.

Street Data	*Major*	*Minor*	.
Street configuration	Two-way	One-way	Major street must be one-way.
Annual average daily traffic (AADT), veh/day	49223	8959	#N/A
Number of through lanes	8	2	Invalid lane count combination.
Number of approaches with left-turn lanes	1	1	.
Number of left-turn movements with protected phasing	1	1	.
Number of right-turn movements prohibited on red	0	0	.
Number of U-turn movements prohibited	1	0	.
Number of approaches with right-turn channelization	1	1	.

Calibration Factors

Calibration Factors	Value	Default Values
Local calibration factor (C)	1.000	1.000
Adjustment factor for pedestrians for stop control (f_{ped})	0.051	0.051
Adjustment factor for bicyclists (f_{bike})	0.029	0.029
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

Manner of Collision Proportions

2x2 intersections	*3ST, F+I*	*3ST, PDO*	*3SG, F+I*	*3SG, PDO*	*4ST, F+I*	*4ST, PDO*	*4SG, F+I*	*4SG, PDO*
Rear-end collision proportion	0.094	0.154	0.120	0.189	0.079	0.098	0.083	0.148
Angle colllision proportion	0.764	0.629	0.676	0.554	0.806	0.707	0.746	0.552
1x2 or 1x1 intersections	*3ST, F+I*	*3ST, PDO*	*3SG, F+I*	*3SG, PDO*	*4ST, F+I*	*4ST, PDO*	*4SG, F+I*	*4SG, PDO*
Rear-end collision proportion	0.100	0.100	0.111	0.143	0.047	0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.571	0.822	0.706	0.837	0.733

Crash Modification Factors

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	1.401	1.401
Vehicle-pedestrian crash CMFs		
Bus stops	1.000	
Schools	1.000	
Alcohol sales establishments	1.000	

Safety Prediction Worksheet for Urban and Suburban Arterial Intersections

General Information

Analyst	PC
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Major street name	MD 187 (Old Georgetown Rd)
Minor street name	I-270 NB Ramp Connector/I-270
Intersection number	6
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	#N/A	#N/A	#N/A
Total-vehicle crashes	#N/A	#N/A	
Vehicle-pedestrian crashes	0.020		
Vehicle-bicycle crashes	#N/A		

Combined CMF

	F+I	PDO
Total-vehicle crashes	1.145	1.145
Vehicle-pedestrian crashes	1.000	

Severity distribution for F+I crashes

K	A	B	C
#N/A	#N/A	#N/A	#N/A

Input Data	*Value*		*Advisory Messages*
Intersection Data			
Area type	Suburban		.
Number of legs	3		3SG intersection type
Traffic control type	Signalized		.
Lighting present?	Yes		.
Red-light cameras present?	No		.
Daily pedestrian volume crossing all legs (peds/day)	175		.
Maximum number of lanes crossed by a pedestrian	6		.
Number of bus stops within 1,000 ft of intersection	0		.
School(s) present within 1,000 ft of intersection?	No		.
Alcohol sales establishments within 1,000 ft	0		.
Street Data	*Major*	*Minor*	.
Street configuration	Two-way	One-way	Major street must be one-way.
Annual average daily traffic (AADT), veh/day	56457	6479	#N/A
Number of through lanes	8	2	Invalid lane count combination.
Number of approaches with left-turn lanes	1	1	.
Number of left-turn movements with protected phasing	1	1	.
Number of right-turn movements prohibited on red	0	0	.
Number of U-turn movements prohibited	1	0	.
Number of approaches with right-turn channelization	1	1	.

Calibration Factors	*Value*	*Default Values*
Local calibration factor (C)	1.000	1.000
Adjustment factor for pedestrians for stop control (f_{ped})	0.051	0.051
Adjustment factor for bicyclists (f_{bike})	0.029	0.029
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

Manner of Collision Proportions

2x2 intersections	*3ST, F+I*	*3ST, PDO*	*3SG, F+I*	*3SG, PDO*	*4ST, F+I*	*4ST, PDO*	*4SG, F+I*	*4SG, PDO*
Rear-end collision proportion	0.094	0.154	0.120	0.189	0.079	0.098	0.083	0.148
Angle colllision proportion	0.764	0.629	0.676	0.554	0.806	0.707	0.746	0.552
1x2 or 1x1 intersections	*3ST, F+I*	*3ST, PDO*	*3SG, F+I*	*3SG, PDO*	*4ST, F+I*	*4ST, PDO*	*4SG, F+I*	*4SG, PDO*
Rear-end collision proportion	0.100	0.100	0.111	0.143	0.047	0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.571	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 and Suburban Arterial Intersections

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Major street name	MD 355 Rockville Pike
Minor street name	Grosvenor Ln
Intersection number	1
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	3.544	2.828	6.373
Total-vehicle crashes	3.221	2.828	
Vehicle-pedestrian crashes	0.209		
Vehicle-bicycle crashes	0.115		

Combined CMF

	F+I	PDO
Total-vehicle crashes	0.528	0.528
Vehicle-pedestrian crashes	4.150	

Severity distribution for F+I crashes

K	A	B	C
0.020	0.196	0.987	2.341

Input Data

Input Data	Value	Advisory Messages
Intersection Data		
Area type	Suburban	.
Number of legs	4	4SG intersection type
Traffic control type	Signalized	.
Lighting present?	Yes	.
Red-light cameras present?	Yes	.
Daily pedestrian volume crossing all legs (peds/day)	156	.
Maximum number of lanes crossed by a pedestrian	7	.
Number of bus stops within 1,000 ft of intersection	4	.
School(s) present within 1,000 ft of intersection?	No	.
Alcohol sales establishments within 1,000 ft	0	.

Street Data	Major	Minor	
Street configuration	Two-way	Two-way	2x2 intersection configuration
Annual average daily traffic (AADT), veh/day	59822	9723	.
Number of through lanes	6	2	.
Number of approaches with left-turn lanes	0	2	.
Number of left-turn movements with protected phasing	0	2	.
Number of right-turn movements prohibited on red	0	0	.
Number of U-turn movements prohibited	2	0	.
Number of approaches with right-turn channelization	0	2	.

Calibration Factors

Calibration Factors	Value	Default Values
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

Manner of Collision Proportions

2x2 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.094	0.154	0.120	0.189	0.079	0.098	0.083	0.148
Angle colllision proportion	0.764	0.629	0.676	0.554	0.806	0.707	0.746	0.552

1x2 or 1x1 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.100	0.100	0.111	0.143	0.047	0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.571	0.822	0.706	0.837	0.733

Crash Modification Factors

Crash Modification Factors	F+I	PDO
Total-vehicle crash CMFs		
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		
Bus stops	4.150	
Schools	1.000	
Alcohol sales establishments	1.000	

Safety Prediction Worksheet for Two-Way Urban and Suburban Arterial Segments

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Street number	MD 355
Street name	Rockville Pike from Grosvenor Ln
Segment number	1
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	1.155	1.515	2.670
Multiple-vehicle crashes	0.775	1.117	
Single-vehicle crashes	0.320	0.398	
Vehicle-pedestrian crashes	0.039		
Vehicle-bicycle crashes	0.021		

Combined CMF

	F+I	PDO
Multiple-vehicle crashes	0.204	0.204
Single-vehicle crashes	0.840	0.840

Severity distribution for F+I crashes

K	A	B	C
0.017	0.091	0.354	0.692

Input Data		*Value*	*Advisory Messages*
Basic Roadway Data			
Area type		Suburban	.
Segment type		6D	.
Segment length, mi		0.46	.
Annual average daily traffic (AADT), veh/day		61335	.
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	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	.

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	*Single*	*Multiple*	*Single*
Lane width	1.000	1.000	1.000	1.000
Outside shoulder width	0.986	0.986	0.986	0.986
Median width	0.390	0.390	0.390	0.390
Median barrier	0.600	1.967	0.600	1.967
Highway-rail grade crossing	1.000	1.000	1.000	1.000
Major commercial driveways	0.932		0.932	
Major industrial driveways	0.989		0.989	
Minor driveways	0.959		0.959	
Automated speed enforcement	1.000	1.000	1.000	1.000
Roadside fixed objects		1.109		1.109

Safety Prediction Worksheet for Urban and Suburban Arterial Intersections

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Major street name	MD 355 Rockville Pike
Minor street name	Pooks Hill Rd
Intersection number	2
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	3.480	2.757	6.236
Total-vehicle crashes	3.225	2.757	
Vehicle-pedestrian crashes	0.082		
Vehicle-bicycle crashes	0.173		

Combined CMF

	F+I	PDO
Total-vehicle crashes	0.634	0.634
Vehicle-pedestrian crashes	4.150	

Severity distribution for F+I crashes

K	A	B	C
0.019	0.188	0.945	2.328

Input Data

Input Data	Value	Advisory Messages
Intersection Data		
Area type	Suburban	.
Number of legs	3	3SG intersection type
Traffic control type	Signalized	.
Lighting present?	Yes	.
Red-light cameras present?	No	.
Daily pedestrian volume crossing all legs (peds/day)	78	.
Maximum number of lanes crossed by a pedestrian	9	.
Number of bus stops within 1,000 ft of intersection	5	.
School(s) present within 1,000 ft of intersection?	No	.
Alcohol sales establishments within 1,000 ft	0	.

Street Data	*Major*	*Minor*	.
Street configuration	Two-way	Two-way	2x2 intersection configuration
Annual average daily traffic (AADT), veh/day	72165	9511	.
Number of through lanes	6	2	.
Number of approaches with left-turn lanes	1	1	.
Number of left-turn movements with protected phasing	1	1	.
Number of right-turn movements prohibited on red	1	0	.
Number of U-turn movements prohibited	1	0	.
Number of approaches with right-turn channelization	0	1	.

Calibration Factors

Calibration Factors	Value	Default Values
Local calibration factor (C)	1.000	1.000
Adjustment factor for pedestrians for stop control (f_{ped})	0.051	0.051
Adjustment factor for bicyclists (f_{bike})	0.029	0.029
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

Manner of Collision Proportions

2x2 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.094	0.154	0.120	0.189	0.079	0.098	0.083	0.148
Angle colllision proportion	0.764	0.629	0.676	0.554	0.806	0.707	0.746	0.552
1x2 or 1x1 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.100	0.100	0.111	0.143	0.047	0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.571	0.822	0.706	0.837	0.733

Crash Modification Factors

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	0.980	0.980
U-turn prohibition	0.960	0.960
Right-turn channelization	1.000	1.000
Number of lanes	1.000	1.000
Vehicle-pedestrian crash CMFs		
Bus stops	4.150	
Schools	1.000	
Alcohol sales establishments	1.000	

Safety Prediction Worksheet for Two-Way Urban and Suburban Arterial Segments

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Street number	MD 355
Street name	Rockville Pike from Pooks Hill Rd
Segment number	2
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	0.716	0.940	1.656
Multiple-vehicle crashes	0.615	0.861	
Single-vehicle crashes	0.064	0.079	
Vehicle-pedestrian crashes	0.024		
Vehicle-bicycle crashes	0.013		

Combined CMF

	F+I	PDO
Multiple-vehicle crashes	1.020	1.020
Single-vehicle crashes	1.191	1.191

Severity distribution for F+I crashes

K	A	B	C
0.009	0.057	0.220	0.430

Input Data		Value	Advisory Messages
Basic Roadway Data			
Area type		Suburban	.
Segment type		6D	.
Segment length, mi		0.06	.
Annual average daily traffic (AADT), veh/day		71893	.
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	0	.
	Major industrial	0	.
	Minor	1	**17 minor 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 objects per mile.**
Average roadside fixed object offset, ft		8	.

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	Single	Multiple	Single
Lane width	1.022	1.022	1.022	1.022
Outside shoulder width	1.044	1.044	1.044	1.044
Median width	1.000	1.000	1.000	1.000
Median barrier	1.000	1.000	1.000	1.000
Highway-rail grade crossing	1.000	1.000	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	1.000	1.000	1.000	1.000
Roadside fixed objects		1.117		1.117

Safety Prediction Worksheet for Urban and Suburban Arterial Intersections

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Major street name	MD 355 Rockville Pike
Minor street name	Bellevue Dr/Alta Vista Rd
Intersection number	3
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	3.565	2.917	6.482
Total-vehicle crashes	3.359	2.917	
Vehicle-pedestrian crashes	0.086		
Vehicle-bicycle crashes	0.119		

Combined CMF

	F+I	PDO
Total-vehicle crashes	0.911	0.911
Vehicle-pedestrian crashes	4.150	

Severity distribution for F+I crashes

K	A	B	C
0.020	0.188	0.942	2.415

Input Data	Value		Advisory Messages
Intersection Data			
Area type	Suburban		.
Number of legs	4		4SG intersection type
Traffic control type	Signalized		.
Lighting present?	Yes		.
Red-light cameras present?	No		.
Daily pedestrian volume crossing all legs (peds/day)	77		.
Maximum number of lanes crossed by a pedestrian	7		.
Number of bus stops within 1,000 ft of intersection	6		.
School(s) present within 1,000 ft of intersection?	No		.
Alcohol sales establishments within 1,000 ft	0		.
Street Data	*Major*	*Minor*	.
Street configuration	Two-way	Two-way	2x2 intersection configuration
Annual average daily traffic (AADT), veh/day	67704	1276	.
Number of through lanes	6	2	.
Number of approaches with left-turn lanes	2	0	.
Number of left-turn movements with protected phasing	0	0	.
Number of right-turn movements prohibited on red	0	0	.
Number of U-turn movements prohibited	0	0	.
Number of approaches with right-turn channelization	0	0	.

Calibration Factors	Value	Default Values
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

Manner of Collision Proportions

2x2 intersections	*3ST, F+I*	*3ST, PDO*	*3SG, F+I*	*3SG, PDO*	*4ST, F+I*	*4ST, PDO*	*4SG, F+I*	*4SG, PDO*
Rear-end collision proportion	0.094	0.154	0.120	0.189	0.079	0.098	0.083	0.148
Angle colllision proportion	0.764	0.629	0.676	0.554	0.806	0.707	0.746	0.552
1x2 or 1x1 intersections	*3ST, F+I*	*3ST, PDO*	*3SG, F+I*	*3SG, PDO*	*4ST, F+I*	*4ST, PDO*	*4SG, F+I*	*4SG, PDO*
Rear-end collision proportion	0.100	0.100	0.111	0.143	0.047	0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.571	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	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		
Bus stops	4.150	
Schools	1.000	
Alcohol sales establishments	1.000	

Safety Prediction Worksheet for Urban and Suburban Arterial Intersections

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Major street name	Sam Eig Hwy
Minor street name	MD 119 Great Senecca Hwy
Intersection number	1
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	3.353	2.942	6.295
Total-vehicle crashes	3.152	2.942	
Vehicle-pedestrian crashes	0.024		
Vehicle-bicycle crashes	0.177		

Combined CMF

	F+I	PDO
Total-vehicle crashes	0.767	0.767
Vehicle-pedestrian crashes	1.000	

Severity distribution for F+I crashes

K	A	B	C
0.019	0.181	0.910	2.243

Input Data

Input Data	Value	Advisory Messages
Intersection Data		
Area type	Suburban	.
Number of legs	3	3SG intersection type
Traffic control type	Signalized	.
Lighting present?	Yes	.
Red-light cameras present?	No	.
Daily pedestrian volume crossing all legs (peds/day)	67	.
Maximum number of lanes crossed by a pedestrian	7	.
Number of bus stops within 1,000 ft of intersection	0	.
School(s) present within 1,000 ft of intersection?	No	.
Alcohol sales establishments within 1,000 ft	0	.

Street Data	Major	Minor	
Street configuration	Two-way	Two-way	2x2 intersection configuration
Annual average daily traffic (AADT), veh/day	38841	31000	Check minor volume.
Number of through lanes	6	4	.
Number of approaches with left-turn lanes	1	1	.
Number of left-turn movements with protected phasing	1	1	.
Number of right-turn movements prohibited on red	0	1	.
Number of U-turn movements prohibited	1	0	.
Number of approaches with right-turn channelization	0	1	.

Calibration Factors

Calibration Factors	Value	Default Values
Local calibration factor (C)	1.000	1.000
Adjustment factor for pedestrians for stop control (f_{ped})	0.051	0.051
Adjustment factor for bicyclists (f_{bike})	0.029	0.029
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

Manner of Collision Proportions

2x2 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.094	0.154	0.120	0.189	0.079	0.098	0.083	0.148
Angle colllision proportion	0.764	0.629	0.676	0.554	0.806	0.707	0.746	0.552

1x2 or 1x1 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.100	0.100	0.111	0.143	0.047	0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.571	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	0.980	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		
Bus stops	1.000	
Schools	1.000	
Alcohol sales establishments	1.000	

Safety Prediction Worksheet for Two-Way Urban and Suburban Arterial Segments

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Street number	I-370
Street name	Sam Eig Hwy from MD 119 to Dia
Segment number	1
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	1.298	1.779	3.077
Multiple-vehicle crashes	0.755	1.181	
Single-vehicle crashes	0.474	0.598	
Vehicle-pedestrian crashes	0.045		
Vehicle-bicycle crashes	0.024		

Combined CMF

	F+I	PDO
Multiple-vehicle crashes	0.517	0.517
Single-vehicle crashes	2.273	2.273

Severity distribution for F+I crashes

K	A	B	C
0.030	0.102	0.395	0.771

Input Data		Value	Advisory Messages
Basic Roadway Data			
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 present		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		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	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	Single	Multiple	Single
Lane width	1.000	1.000	1.000	1.000
Outside shoulder width	1.014	1.014	1.014	1.014
Median width	0.972	0.972	0.972	0.972
Median barrier	0.600	1.967	0.600	1.967
Highway-rail grade crossing	1.000	1.000	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
Roadside fixed objects		1.172		1.172

Safety Prediction Worksheet for Urban and Suburban Arterial Intersections

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Major street name	Sam Eig Hwy
Minor street name	Diamondback Dr
Intersection number	2
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	6.352	5.362	11.714
Total-vehicle crashes	5.873	5.362	
Vehicle-pedestrian crashes	0.266		
Vehicle-bicycle crashes	0.213		

Combined CMF

	F+I	PDO
Total-vehicle crashes	0.935	0.935
Vehicle-pedestrian crashes	4.150	

Severity distribution for F+I crashes

K	A	B	C
0.028	0.265	1.537	4.522

Input Data	Value	Advisory Messages
Intersection Data		
Area type	Suburban	.
Number of legs	4	4SG intersection type
Traffic control type	Signalized	.
Lighting present?	Yes	.
Red-light cameras present?	No	.
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?	No	.
Alcohol sales establishments within 1,000 ft	0	.

Street Data	Major	Minor	
Street configuration	Two-way	Two-way	2x2 intersection configuration
Annual average daily traffic (AADT), veh/day	38864	19215	.
Number of through lanes	6	4	.
Number of approaches with left-turn lanes	2	1	.
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	.

Calibration Factors	Value	Default Values
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

Manner of Collision Proportions

2x2 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.094	0.154	0.120	0.189	0.079	0.098	0.083	0.148
Angle colllision proportion	0.764	0.629	0.676	0.554	0.806	0.707	0.746	0.552

1x2 or 1x1 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.100	0.100	0.111	0.143	0.047	0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.571	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	0.636	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	1.157	1.157
Vehicle-pedestrian crash CMFs		
Bus stops	4.150	
Schools	1.000	
Alcohol sales establishments	1.000	

Safety Prediction Worksheet for Two-Way Urban and Suburban Arterial Segments

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Street number	I-370
Street name	Sam Eig Hwy from Diamondback
Segment number	2
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	0.273	0.374	0.647
Multiple-vehicle crashes	0.156	0.244	
Single-vehicle crashes	0.103	0.130	
Vehicle-pedestrian crashes	0.009		
Vehicle-bicycle crashes	0.005		

Combined CMF

	F+I	PDO
Multiple-vehicle crashes	0.557	0.557
Single-vehicle crashes	2.564	2.564

Severity distribution for F+I crashes

K	A	B	C
0.006	0.021	0.083	0.162

Input Data		*Value*	*Advisory Messages*
Basic Roadway Data			
Area type		Suburban	.
Segment type		6D	.
Segment length, mi		0.06	.
Annual average daily traffic (AADT), veh/day		38714	.
Number of highway-rail grade crossings present		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	*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	*Single*	*Multiple*	*Single*
Lane width	1.000	1.000	1.000	1.000
Outside shoulder width	1.014	1.014	1.014	1.014
Median width	1.047	1.047	1.047	1.047
Median barrier	0.600	1.967	0.600	1.967
Highway-rail grade crossing	1.000	1.000	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
Roadside fixed objects		1.228		1.228

Safety Prediction Worksheet for Urban and Suburban Arterial Intersections

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Major street name	Sam Eig Hwy
Minor street name	Fields Rd
Intersection number	3
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	3.542	3.049	6.592
Total-vehicle crashes	3.231	3.049	
Vehicle-pedestrian crashes	0.130		
Vehicle-bicycle crashes	0.182		

Combined CMF

	F+I	PDO
Total-vehicle crashes	0.856	0.856
Vehicle-pedestrian crashes	3.114	

Severity distribution for F+I crashes

K	A	B	C
0.020	0.191	0.962	2.370

Input Data	Value		Advisory Messages
Intersection Data			
Area type	Suburban		.
Number of legs	3		3SG intersection type
Traffic control type	Signalized		.
Lighting present?	Yes		.
Red-light cameras present?	No		.
Daily pedestrian volume crossing all legs (peds/day)	151		.
Maximum number of lanes crossed by a pedestrian	11		.
Number of bus stops within 1,000 ft of intersection	1		.
School(s) present within 1,000 ft of intersection?	No		.
Alcohol sales establishments within 1,000 ft	1		.
Street Data	*Major*	*Minor*	.
Street configuration	Two-way	Two-way	2x2 intersection configuration
Annual average daily traffic (AADT), veh/day	38611	18696	.
Number of through lanes	6	4	.
Number of approaches with left-turn lanes	1	1	.
Number of left-turn movements with protected phasing	1	1	.
Number of right-turn movements prohibited on red	1	1	.
Number of U-turn movements prohibited	1	1	.
Number of approaches with right-turn channelization	1	1	.

Calibration Factors	Value	Default Values
Local calibration factor (C)	1.000	1.000
Adjustment factor for pedestrians for stop control (f_{ped})	0.051	0.051
Adjustment factor for bicyclists (f_{bike})	0.029	0.029
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

Manner of Collision Proportions

2x2 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.094	0.154	0.120	0.189	0.079	0.098	0.083	0.148
Angle colllision proportion	0.764	0.629	0.676	0.554	0.806	0.707	0.746	0.552

1x2 or 1x1 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.100	0.100	0.111	0.143	0.047	0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.571	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	1.155	1.155
Vehicle-pedestrian crash CMFs		
Bus stops	2.780	
Schools	1.000	
Alcohol sales establishments	1.120	

Safety Prediction Worksheet for Urban and Suburban Arterial Intersections

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Major street name	Shady Grove Rd
Minor street name	Corporate Blvd
Intersection number	1
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	3.392	2.804	6.195
Total-vehicle crashes	3.087	2.804	
Vehicle-pedestrian crashes	0.192		
Vehicle-bicycle crashes	0.112		

Combined CMF

	F+I	PDO
Total-vehicle crashes	0.674	0.674
Vehicle-pedestrian crashes	4.648	

Severity distribution for F+I crashes

K	A	B	C
0.019	0.179	0.897	2.298

Input Data	*Value*	*Advisory Messages*
Intersection Data		
Area type	Suburban	.
Number of legs	4	4SG intersection type
Traffic control type	Signalized	.
Lighting present?	Yes	.
Red-light cameras present?	No	.
Daily pedestrian volume crossing all legs (peds/day)	161	.
Maximum number of lanes crossed by a pedestrian	7	.
Number of bus stops within 1,000 ft of intersection	4	.
School(s) present within 1,000 ft of intersection?	No	.
Alcohol sales establishments within 1,000 ft	1	.

Street Data	*Major*	*Minor*	.
Street configuration	Two-way	Two-way	2x2 intersection configuration
Annual average daily traffic (AADT), veh/day	41241	5528	.
Number of through lanes	6	2	.
Number of approaches with left-turn lanes	2	1	.
Number of left-turn movements with protected phasing	0	2	.
Number of right-turn movements prohibited on red	0	0	.
Number of U-turn movements prohibited	0	0	.
Number of approaches with right-turn channelization	0	0	.

Calibration Factors	*Value*	*Default Values*
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

Manner of Collision Proportions

2x2 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.094	0.154	0.120	0.189	0.079	0.098	0.083	0.148
Angle colllision proportion	0.764	0.629	0.676	0.554	0.806	0.707	0.746	0.552
1x2 or 1x1 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.100	0.100	0.111	0.143	0.047	0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.571	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	1.000	1.000
Number of lanes	1.000	1.000
Vehicle-pedestrian crash CMFs		
Bus stops	4.150	
Schools	1.000	
Alcohol sales establishments	1.120	

Safety Prediction Worksheet for Two-Way Urban and Suburban Arterial Segments

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Street number	Shady Grove Rd
Street name	Corporate Blvd to I-270 SB Ramp
Segment number	1
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	0.271	0.368	0.639
Multiple-vehicle crashes	0.155	0.240	
Single-vehicle crashes	0.101	0.128	
Vehicle-pedestrian crashes	0.009		
Vehicle-bicycle crashes	0.005		

Combined CMF

	F+I	PDO
Multiple-vehicle crashes	0.514	0.514
Single-vehicle crashes	2.446	2.446

Severity distribution for F+I crashes

K	A	B	C
0.004	0.021	0.083	0.162

Input Data		Value	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		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		6	**100 objects per mile.**
Average roadside fixed object offset, ft		10	.

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	Single	Multiple	Single
Lane width	1.022	1.022	1.022	1.022
Outside shoulder width	0.958	0.958	0.958	0.958
Median width	1.000	1.000	1.000	1.000
Median barrier	0.600	1.967	0.600	1.967
Highway-rail grade crossing	1.000	1.000	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
Roadside fixed objects		1.270		1.270

Safety Prediction Worksheet for Two-Way Urban and Suburban Arterial Segments

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Street number	Shady Grove Rd
Street name	I-270 SB Ramps to I-270 NB Ran
Segment number	2
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	0.362	0.492	0.854
Multiple-vehicle crashes	0.212	0.327	
Single-vehicle crashes	0.131	0.165	
Vehicle-pedestrian crashes	0.013		
Vehicle-bicycle crashes	0.007		

Combined CMF

	F+I	PDO
Multiple-vehicle crashes	0.514	0.514
Single-vehicle crashes	2.357	2.357

Severity distribution for F+I crashes

K	A	B	C
0.005	0.029	0.111	0.217

Input Data		Value	Advisory Messages
Basic Roadway Data			
Area type		Suburban	.
Segment type		6D	.
Segment length, mi		0.08	.
Annual average daily traffic (AADT), veh/day		41969	.
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	.

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	Single	Multiple	Single
Lane width	1.000	1.000	1.000	1.000
Outside shoulder width	0.931	0.931	0.931	0.931
Median width	1.053	1.053	1.053	1.053
Median barrier	0.600	1.967	0.600	1.967
Highway-rail grade crossing	1.000	1.000	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
Roadside fixed objects		1.222		1.222

Safety Prediction Worksheet for Two-Way Urban and Suburban Arterial Segments

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Street number	Shady Grove Rd
Street name	I-270 NB Ramps to Choke Cherry
Segment number	3
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	0.670	0.918	1.589
Multiple-vehicle crashes	0.447	0.682	
Single-vehicle crashes	0.188	0.236	
Vehicle-pedestrian crashes	0.023		
Vehicle-bicycle crashes	0.012		

Combined CMF

	F+I	PDO
Multiple-vehicle crashes	0.731	0.731
Single-vehicle crashes	2.387	2.387

Severity distribution for F+I crashes

K	A	B	C
0.010	0.053	0.206	0.402

Input Data		*Value*	*Advisory Messages*
Basic Roadway Data			
Area type		Suburban	.
Segment type		6D	.
Segment length, mi		0.11	.
Annual average daily traffic (AADT), veh/day		44601	.
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	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	*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	*Single*	*Multiple*	*Single*
Lane width	1.000	1.000	1.000	1.000
Outside shoulder width	1.014	1.014	1.014	1.014
Median width	1.000	1.000	1.000	1.000
Median barrier	0.600	1.967	0.600	1.967
Highway-rail grade crossing	1.000	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	1.000	1.000
Roadside fixed objects		1.196		1.196

Safety Prediction Worksheet for Urban and Suburban Arterial Intersections

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Major street name	Shady Grove Rd
Minor street name	Choke Cherry Rd
Intersection number	2
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	4.298	3.534	7.832
Total-vehicle crashes	3.905	3.534	
Vehicle-pedestrian crashes	0.252		
Vehicle-bicycle crashes	0.141		

Combined CMF

	F+I	PDO
Total-vehicle crashes	0.731	0.731
Vehicle-pedestrian crashes	4.150	

Severity distribution for F+I crashes

K	A	B	C
0.024	0.227	1.136	2.911

Input Data

Input Data	Value	Advisory Messages
Intersection Data		
Area type	Suburban	.
Number of legs	4	4SG intersection type
Traffic control type	Signalized	.
Lighting present?	Yes	.
Red-light cameras present?	No	.
Daily pedestrian volume crossing all legs (peds/day)	237	.
Maximum number of lanes crossed by a pedestrian	8	.
Number of bus stops within 1,000 ft of intersection	2	.
School(s) present within 1,000 ft of intersection?	No	.
Alcohol sales establishments within 1,000 ft	0	.

Street Data	Major	Minor	
Street configuration	Two-way	Two-way	2x2 intersection configuration
Annual average daily traffic (AADT), veh/day	42749	9303	.
Number of through lanes	6	4	.
Number of approaches with left-turn lanes	2	1	.
Number of left-turn movements with protected phasing	0	2	.
Number of right-turn movements prohibited on red	0	0	.
Number of U-turn movements prohibited	0	0	.
Number of approaches with right-turn channelization	0		.

Calibration Factors

Calibration Factors	Value	Default Values
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

Manner of Collision Proportions

2x2 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.094	0.154	0.120	0.189	0.079	0.098	0.083	0.148
Angle colllision proportion	0.764	0.629	0.676	0.554	0.806	0.707	0.746	0.552

1x2 or 1x1 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.100	0.100	0.111	0.143	0.047	0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.571	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	1.000	1.000
Number of lanes	1.085	1.085
Vehicle-pedestrian crash CMFs		
Bus stops	4.150	
Schools	1.000	
Alcohol sales establishments	1.000	

Crossroad Predictive Crash Analysis

Predicted Crash Frequency for Six-Lane and One-Way Urban and Suburban Arterials using NCHRP Report 17-58

for the

Preferred Alternative

Safety Prediction Worksheet for Two-Way Urban and Suburban Arterial Segments

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Street number	CO-166
Street name	Democracy Blvd from Taveshire
Segment number	1
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	0.718	0.987	1.705
Multiple-vehicle crashes	0.473	0.726	
Single-vehicle crashes	0.207	0.261	
Vehicle-pedestrian crashes	0.025		
Vehicle-bicycle crashes	0.013		

Combined CMF

	F+I	PDO
Multiple-vehicle crashes	0.685	0.685
Single-vehicle crashes	2.266	2.266

Severity distribution for F+I crashes

K	A	B	C
0.009	0.057	0.221	0.431

Input Data		*Value*	*Advisory Messages*
Basic Roadway Data			
Area type		Suburban	.
Segment type		6D	.
Segment length, mi		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		5	**38 objects per mile.**
Average roadside fixed object offset, ft		7	.

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	*Single*	*Multiple*	*Single*
Lane width	1.045	1.045	1.045	1.045
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 crossing	1.000	1.000	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	1.000	1.000	1.000	1.000
Roadside fixed objects		1.154		1.154

Safety Prediction Worksheet for Two-Way Urban and Suburban Arterial Segments

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Street number	CO-166
Street name	Democracy Blvd from I-270 On-R
Segment number	2
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	1.892	2.585	4.477
Multiple-vehicle crashes	1.115	1.733	
Single-vehicle crashes	0.676	0.852	
Vehicle-pedestrian crashes	0.066		
Vehicle-bicycle crashes	0.035		

Combined CMF

	F+I	PDO
Multiple-vehicle crashes	0.527	0.527
Single-vehicle crashes	2.299	2.299

Severity distribution for F+I crashes

K	A	B	C
0.023	0.150	0.582	1.137

Input Data		*Value*	*Advisory Messages*
Basic Roadway Data			
Area type		Suburban	.
Segment type		6D	.
Segment length, mi		0.43	.
Annual average daily traffic (AADT), veh/day		40470	.
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	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 fixed object count		24	**56 objects per mile.**
Average roadside fixed object offset, ft		7	.

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	*Single*	*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 crossing	1.000	1.000	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	1.000	1.000	1.000
Roadside fixed objects		1.223		1.223

Safety Prediction Worksheet for Urban and Suburban Arterial Intersections

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Major street name	Democracy Blvd
Minor street name	Taveshire Way
Intersection number	1
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	2.466	2.201	4.668
Total-vehicle crashes	2.313	2.201	
Vehicle-pedestrian crashes	0.022		
Vehicle-bicycle crashes	0.131		

Combined CMF

	F+I	PDO
Total-vehicle crashes	0.721	0.721
Vehicle-pedestrian crashes	1.000	

Severity distribution for F+I crashes

K	A	B	C
0.014	0.136	0.687	1.629

Input Data

Input Data	Value	Advisory Messages
Intersection Data		
Area type	Suburban	.
Number of legs	3	3SG intersection type
Traffic control type	Signalized	.
Lighting present?	Yes	.
Red-light cameras present?	No	.
Daily pedestrian volume crossing all legs (peds/day)	166	.
Maximum number of lanes crossed by a pedestrian	8	.
Number of bus stops within 1,000 ft of intersection	0	.
School(s) present within 1,000 ft of intersection?	No	.
Alcohol sales establishments within 1,000 ft	0	.

Street Data	Major	Minor	
Street configuration	Two-way	Two-way	2x2 intersection configuration
Annual average daily traffic (AADT), veh/day	43743	4075	.
Number of through lanes	6	4	.
Number of approaches with left-turn lanes	0	1	.
Number of left-turn movements with protected phasing	0	1	.
Number of right-turn movements prohibited on red	0	0	.
Number of U-turn movements prohibited	2	1	.
Number of approaches with right-turn channelization	0	0	.

Calibration Factors

Calibration Factors	Value	Default Values
Local calibration factor (C)	1.000	1.000
Adjustment factor for pedestrians for stop control (f_{ped})	0.051	0.051
Adjustment factor for bicyclists (f_{bike})	0.029	0.029
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

Manner of Collision Proportions

2x2 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.094	0.154	0.120	0.189	0.079	0.098	0.083	0.148
Angle colllision proportion	0.764	0.629	0.676	0.554	0.806	0.707	0.746	0.552

1x2 or 1x1 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.100	0.100	0.111	0.143	0.047	0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.571	0.822	0.706	0.837	0.733

Crash Modification Factors

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	0.860	0.860
Right-turn-on-red	1.000	1.000
U-turn prohibition	0.885	0.885
Right-turn channelization	1.000	1.000
Number of lanes	1.040	1.040
Vehicle-pedestrian crash CMFs		
Bus stops	1.000	
Schools	1.000	
Alcohol sales establishments	1.000	

Safety Prediction Worksheet for Urban and Suburban Arterial Intersections

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Major street name	Democracy Blvd
Minor street name	Fernwood Road
Intersection number	2
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	4.325	3.614	7.939
Total-vehicle crashes	3.858	3.614	
Vehicle-pedestrian crashes	0.326		
Vehicle-bicycle crashes	0.142		

Combined CMF

	F+I	PDO
Total-vehicle crashes	0.752	0.752
Vehicle-pedestrian crashes	4.150	

Severity distribution for F+I crashes

K	A	B	C
0.024	0.228	1.143	2.930

Input Data

Input Data	Value	Advisory Messages
Intersection Data		
Area type	Suburban	.
Number of legs	4	4SG intersection type
Traffic control type	Signalized	.
Lighting present?	Yes	.
Red-light cameras present?	Yes	.
Daily pedestrian volume crossing all legs (peds/day)	328	.
Maximum number of lanes crossed by a pedestrian	8	.
Number of bus stops within 1,000 ft of intersection	2	.
School(s) present within 1,000 ft of intersection?	No	.
Alcohol sales establishments within 1,000 ft	0	.

Street Data	Major	Minor	
Street configuration	Two-way	Two-way	2x2 intersection configuration
Annual average daily traffic (AADT), veh/day	29192	13289	.
Number of through lanes	6	4	.
Number of approaches with left-turn lanes	2	2	.
Number of left-turn movements with protected phasing	2	2	.
Number of right-turn movements prohibited on red	0	0	.
Number of U-turn movements prohibited	0	0	.
Number of approaches with right-turn channelization	2	2	.

Calibration Factors

Calibration Factors	Value	Default Values
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

Manner of Collision Proportions

2x2 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.094	0.154	0.120	0.189	0.079	0.098	0.083	0.148
Angle colllision proportion	0.764	0.629	0.676	0.554	0.806	0.707	0.746	0.552

1x2 or 1x1 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.100	0.100	0.111	0.143	0.047	0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.571	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	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 CMFs		
Bus stops	4.150	
Schools	1.000	
Alcohol sales establishments	1.000	

Safety Prediction Worksheet for Urban and Suburban Arterial Intersections

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Major street name	MD 187 Old Georgetown Rd
Minor street name	Lone Oak Way/Manor Oak Way
Intersection number	1
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	4.455	3.579	8.034
Total-vehicle crashes	4.023	3.579	
Vehicle-pedestrian crashes	0.288		
Vehicle-bicycle crashes	0.144		

Combined CMF

	F+I	PDO
Total-vehicle crashes	0.911	0.911
Vehicle-pedestrian crashes	5.603	

Severity distribution for F+I crashes

K	A	B	C
0.024	0.235	1.178	3.018

Input Data

Input Data	Value	Advisory Messages
Intersection Data		
Area type	Suburban	.
Number of legs	4	4SG intersection type
Traffic control type	Signalized	.
Lighting present?	Yes	.
Red-light cameras present?	No	.
Daily pedestrian volume crossing all legs (peds/day)	301	.
Maximum number of lanes crossed by a pedestrian	8	.
Number of bus stops within 1,000 ft of intersection	6	.
School(s) present within 1,000 ft of intersection?	Yes	.
Alcohol sales establishments within 1,000 ft	0	.

Street Data	Major	Minor	
Street configuration	Two-way	Two-way	2x2 intersection configuration
Annual average daily traffic (AADT), veh/day	51730	3563	.
Number of through lanes	6	2	.
Number of approaches with left-turn lanes	2	0	.
Number of left-turn movements with protected phasing	0	0	.
Number of right-turn movements prohibited on red	0	0	.
Number of U-turn movements prohibited	0	0	.
Number of approaches with right-turn channelization	0	0	.

Calibration Factors

Calibration Factors	Value	Default Values
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

Manner of Collision Proportions

2x2 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.094	0.154	0.120	0.189	0.079	0.098	0.083	0.148
Angle colllision proportion	0.764	0.629	0.676	0.554	0.806	0.707	0.746	0.552

1x2 or 1x1 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.100	0.100	0.111	0.143	0.047	0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.571	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	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		
Bus stops	4.150	
Schools	1.350	
Alcohol sales establishments	1.000	

Safety Prediction Worksheet for Two-Way Urban and Suburban Arterial Segments

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Street number	MD 187
Street name	Lone Oak Way/Manor Oak Way t
Segment number	1
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	1.432	1.912	3.343
Multiple-vehicle crashes	0.929	1.378	
Single-vehicle crashes	0.427	0.534	
Vehicle-pedestrian crashes	0.049		
Vehicle-bicycle crashes	0.026		

Combined CMF

	F+I	PDO
Multiple-vehicle crashes	0.569	0.569
Single-vehicle crashes	2.308	2.308

Severity distribution for F+I crashes

K	A	B	C
0.022	0.113	0.439	0.858

Input Data		Value	Advisory Messages
Basic Roadway Data			
Area type		Suburban	.
Segment type		6D	.
Segment length, mi		0.24	.
Annual average daily traffic (AADT), veh/day		52544	.
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	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		8	.

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	Single	Multiple	Single
Lane width	1.022	1.022	1.022	1.022
Outside shoulder width	1.014	1.014	1.014	1.014
Median width	1.000	1.000	1.000	1.000
Median barrier	0.600	1.967	0.600	1.967
Highway-rail grade crossing	1.000	1.000	1.000	1.000
Major commercial driveways	0.932		0.932	
Major industrial driveways	0.989		0.989	
Minor driveways	0.991		0.991	
Automated speed enforcement	1.000	1.000	1.000	1.000
Roadside fixed objects		1.131		1.131

Safety Prediction Worksheet for Two-Way Urban and Suburban Arterial Segments

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Street number	MD 187
Street name	I-495 to Ryland Dr
Segment number	2
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	0.465	0.618	1.083
Multiple-vehicle crashes	0.281	0.419	
Single-vehicle crashes	0.159	0.199	
Vehicle-pedestrian crashes	0.016		
Vehicle-bicycle crashes	0.008		

Combined CMF

	F+I	PDO
Multiple-vehicle crashes	0.535	0.535
Single-vehicle crashes	2.614	2.614

Severity distribution for F+I crashes

K	A	B	C
0.007	0.037	0.143	0.278

Input Data		*Value*	*Advisory Messages*
Basic Roadway Data			
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 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		1	.
Median width, ft		18	.
Median barrier present?		Yes	.
Roadside Data			
Roadside fixed object count		9	**113 objects per mile.**
Average roadside fixed object offset, ft		10	.

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	*Single*	*Multiple*	*Single*
Lane width	1.022	1.022	1.022	1.022
Outside shoulder width	1.014	1.014	1.014	1.014
Median width	0.983	0.983	0.983	0.983
Median barrier	0.600	1.967	0.600	1.967
Highway-rail grade crossing	1.000	1.000	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
Roadside fixed objects		1.304		1.304

Safety Prediction Worksheet for Urban and Suburban Arterial Intersections

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Major street name	MD 187 Old Georgetown Rd
Minor street name	Ryland Dr
Intersection number	2
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	4.485	3.663	8.148
Total-vehicle crashes	4.111	3.663	
Vehicle-pedestrian crashes	0.226		
Vehicle-bicycle crashes	0.148		

Combined CMF

	F+I	PDO
Total-vehicle crashes	0.911	0.911
Vehicle-pedestrian crashes	5.603	

Severity distribution for F+I crashes

K	A	B	C
0.025	0.237	1.186	3.038

Input Data

Input Data	Value	Advisory Messages
Intersection Data		
Area type	Suburban	.
Number of legs	4	4SG intersection type
Traffic control type	Signalized	.
Lighting present?	Yes	.
Red-light cameras present?	No	.
Daily pedestrian volume crossing all legs (peds/day)	182	.
Maximum number of lanes crossed by a pedestrian	7	.
Number of bus stops within 1,000 ft of intersection	5	.
School(s) present within 1,000 ft of intersection?	Yes	.
Alcohol sales establishments within 1,000 ft	0	.

Street Data	*Major*	*Minor*	.
Street configuration	Two-way	Two-way	2x2 intersection configuration
Annual average daily traffic (AADT), veh/day	50974	3938	.
Number of through lanes	6	2	.
Number of approaches with left-turn lanes	2	1	.
Number of left-turn movements with protected phasing	0	0	.
Number of right-turn movements prohibited on red	0	0	.
Number of U-turn movements prohibited	0	0	.
Number of approaches with right-turn channelization	0	0	.

Calibration Factors

Calibration Factors	Value	Default Values
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

Manner of Collision Proportions

2x2 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.094	0.154	0.120	0.189	0.079	0.098	0.083	0.148
Angle colllision proportion	0.764	0.629	0.676	0.554	0.806	0.707	0.746	0.552
1x2 or 1x1 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.100	0.100	0.111	0.143	0.047	0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.571	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	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		
Bus stops	4.150	
Schools	1.350	
Alcohol sales establishments	1.000	

Safety Prediction Worksheet for Two-Way Urban and Suburban Arterial Segments

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Street number	MD 187
Street name	Old Georgetown Rd from Rock S
Segment number	1
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	0.857	1.100	1.957
Multiple-vehicle crashes	0.370	0.546	
Single-vehicle crashes	0.443	0.554	
Vehicle-pedestrian crashes	0.029		
Vehicle-bicycle crashes	0.015		

Combined CMF

	F+I	PDO
Multiple-vehicle crashes	0.529	0.529
Single-vehicle crashes	5.686	5.686

Severity distribution for F+I crashes

K	A	B	C
0.013	0.068	0.263	0.513

Input Data		*Value*	*Advisory Messages*
Basic Roadway Data			
Area type		Suburban	.
Segment type		6D	.
Segment length, mi		0.1	.
Annual average daily traffic (AADT), veh/day		53713	.
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	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 objects per mile.**
Average roadside fixed object offset, ft		3	.

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	*Single*	*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 crossing	1.000	1.000	1.000	1.000
Major commercial driveways	0.932		0.932	
Major industrial driveways	0.989		0.989	
Minor driveways	1.000		1.000	
Automated speed enforcement	1.000	1.000	1.000	1.000
Roadside fixed objects		3.025		3.025

Safety Prediction Worksheet for Two-Way Urban and Suburban Arterial Segments

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Street number	MD 187
Street name	Old Georgetown Rd from I-270 N
Segment number	2
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	1.071	1.382	2.453
Multiple-vehicle crashes	0.553	0.806	
Single-vehicle crashes	0.462	0.577	
Vehicle-pedestrian crashes	0.036		
Vehicle-bicycle crashes	0.019		

Combined CMF

	F+I	PDO
Multiple-vehicle crashes	0.515	0.515
Single-vehicle crashes	4.098	4.098

Severity distribution for F+I crashes

K	A	B	C
0.016	0.084	0.329	0.641

Input Data		*Value*	*Advisory Messages*
Basic Roadway Data			
Area type		Suburban	.
Segment type		6D	.
Segment length, mi		0.14	.
Annual average daily traffic (AADT), veh/day		57854	.
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	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			
Roadside fixed object count		25	**179 objects per mile.**
Average roadside fixed object offset, ft		3	.

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	*Single*	*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	0.945	0.945	0.945	0.945
Median barrier	0.600	1.967	0.600	1.967
Highway-rail grade crossing	1.000	1.000	1.000	1.000
Major commercial driveways	0.932		0.932	
Major industrial driveways	0.989		0.989	
Minor driveways	0.985		0.985	
Automated speed enforcement	1.000	1.000	1.000	1.000
Roadside fixed objects		2.205		2.205

Safety Prediction Worksheet for Urban and Suburban Arterial Intersections

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Major street name	MD 187 (Old Georgetown Rd)
Minor street name	Rock Spring Dr
Intersection number	4
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	4.936	3.800	8.736
Total-vehicle crashes	4.280	3.800	
Vehicle-pedestrian crashes	0.503		
Vehicle-bicycle crashes	0.154		

Combined CMF

	F+I	PDO
Total-vehicle crashes	0.619	0.619
Vehicle-pedestrian crashes	6.275	

Severity distribution for F+I crashes

K	A	B	C
0.027	0.260	1.305	3.344

Input Data

Input Data	Value	Advisory Messages
Intersection Data		
Area type	Suburban	.
Number of legs	4	4SG intersection type
Traffic control type	Signalized	.
Lighting present?	Yes	.
Red-light cameras present?	No	.
Daily pedestrian volume crossing all legs (peds/day)	256	.
Maximum number of lanes crossed by a pedestrian	8	.
Number of bus stops within 1,000 ft of intersection	2	.
School(s) present within 1,000 ft of intersection?	Yes	.
Alcohol sales establishments within 1,000 ft	2	.

Street Data	Major	Minor	
Street configuration	Two-way	Two-way	2x2 intersection configuration
Annual average daily traffic (AADT), veh/day	52878	18165	.
Number of through lanes	6	2	.
Number of approaches with left-turn lanes	2	1	.
Number of left-turn movements with protected phasing	2	2	.
Number of right-turn movements prohibited on red	0	0	.
Number of U-turn movements prohibited	0	0	.
Number of approaches with right-turn channelization	1	0	.

Calibration Factors

Calibration Factors	Value	Default Values
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

Manner of Collision Proportions

2x2 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.094	0.154	0.120	0.189	0.079	0.098	0.083	0.148
Angle colllision proportion	0.764	0.629	0.676	0.554	0.806	0.707	0.746	0.552

1x2 or 1x1 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.100	0.100	0.111	0.143	0.047	0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.571	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	0.547	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		
Bus stops	4.150	
Schools	1.350	
Alcohol sales establishments	1.120	

Safety Prediction Worksheet for Urban and Suburban Arterial Intersections

General Information

Analyst	PC
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Major street name	MD 187 (Old Georgetown Rd)
Minor street name	I-270 SB Ramp Connector/I-270
Intersection number	5
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	#N/A	#N/A	#N/A
Total-vehicle crashes	#N/A	#N/A	
Vehicle-pedestrian crashes	0.014		
Vehicle-bicycle crashes	#N/A		

Combined CMF

	F+I	PDO
Total-vehicle crashes	1.126	1.126
Vehicle-pedestrian crashes	1.000	

Severity distribution for F+I crashes

K	A	B	C
#N/A	#N/A	#N/A	#N/A

Input Data

Input Data	Value	Advisory Messages
Intersection Data		
Area type	Suburban	.
Number of legs	3	3SG intersection type
Traffic control type	Signalized	.
Lighting present?	Yes	.
Red-light cameras present?	No	.
Daily pedestrian volume crossing all legs (peds/day)	52	.
Maximum number of lanes crossed by a pedestrian	6	.
Number of bus stops within 1,000 ft of intersection	0	.
School(s) present within 1,000 ft of intersection?	No	.
Alcohol sales establishments within 1,000 ft	0	.

Street Data	*Major*	*Minor*	.
Street configuration	Two-way	One-way	Major street must be one-way.
Annual average daily traffic (AADT), veh/day	49223	8959	#N/A
Number of through lanes	8	2	Invalid lane count combination.
Number of approaches with left-turn lanes	1	1	.
Number of left-turn movements with protected phasing	1	1	.
Number of right-turn movements prohibited on red	0	0	.
Number of U-turn movements prohibited	1	0	.
Number of approaches with right-turn channelization	1	1	.

Calibration Factors

Calibration Factors	Value	Default Values
Local calibration factor (C)	1.000	1.000
Adjustment factor for pedestrians for stop control (f_{ped})	0.051	0.051
Adjustment factor for bicyclists (f_{bike})	0.029	0.029
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

Manner of Collision Proportions

2x2 intersections	*3ST, F+I*	*3ST, PDO*	*3SG, F+I*	*3SG, PDO*	*4ST, F+I*	*4ST, PDO*	*4SG, F+I*	*4SG, PDO*
Rear-end collision proportion	0.094	0.154	0.120	0.189	0.079	0.098	0.083	0.148
Angle colllision proportion	0.764	0.629	0.676	0.554	0.806	0.707	0.746	0.552
1x2 or 1x1 intersections	*3ST, F+I*	*3ST, PDO*	*3SG, F+I*	*3SG, PDO*	*4ST, F+I*	*4ST, PDO*	*4SG, F+I*	*4SG, PDO*
Rear-end collision proportion	0.100	0.100	0.111	0.143	0.047	0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.571	0.822	0.706	0.837	0.733

Crash Modification Factors

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	1.401	1.401
Vehicle-pedestrian crash CMFs		
Bus stops	1.000	
Schools	1.000	
Alcohol sales establishments	1.000	

Safety Prediction Worksheet for Urban and Suburban Arterial Intersections

General Information

Analyst	PC
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Major street name	MD 187 (Old Georgetown Rd)
Minor street name	I-270 NB Ramp Connector/I-270
Intersection number	6
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	#N/A	#N/A	#N/A
Total-vehicle crashes	#N/A	#N/A	
Vehicle-pedestrian crashes	0.020		
Vehicle-bicycle crashes	#N/A		

Combined CMF

	F+I	PDO
Total-vehicle crashes	1.145	1.145
Vehicle-pedestrian crashes	1.000	

Severity distribution for F+I crashes

K	A	B	C
#N/A	#N/A	#N/A	#N/A

Input Data	*Value*		*Advisory Messages*
Intersection Data			
Area type	Suburban		.
Number of legs	3		3SG intersection type
Traffic control type	Signalized		.
Lighting present?	Yes		.
Red-light cameras present?	No		.
Daily pedestrian volume crossing all legs (peds/day)	175		.
Maximum number of lanes crossed by a pedestrian	6		.
Number of bus stops within 1,000 ft of intersection	0		.
School(s) present within 1,000 ft of intersection?	No		.
Alcohol sales establishments within 1,000 ft	0		.
Street Data	*Major*	*Minor*	.
Street configuration	Two-way	One-way	Major street must be one-way.
Annual average daily traffic (AADT), veh/day	56457	6479	#N/A
Number of through lanes	8	2	Invalid lane count combination.
Number of approaches with left-turn lanes	1	1	.
Number of left-turn movements with protected phasing	1	1	.
Number of right-turn movements prohibited on red	0	0	.
Number of U-turn movements prohibited	1	0	.
Number of approaches with right-turn channelization	1	1	.

Calibration Factors	*Value*	*Default Values*
Local calibration factor (C)	1.000	1.000
Adjustment factor for pedestrians for stop control (f_{ped})	0.051	0.051
Adjustment factor for bicyclists (f_{bike})	0.029	0.029
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

Manner of Collision Proportions

2x2 intersections	*3ST, F+I*	*3ST, PDO*	*3SG, F+I*	*3SG, PDO*	*4ST, F+I*	*4ST, PDO*	*4SG, F+I*	*4SG, PDO*
Rear-end collision proportion	0.094	0.154	0.120	0.189	0.079	0.098	0.083	0.148
Angle colllision proportion	0.764	0.629	0.676	0.554	0.806	0.707	0.746	0.552
1x2 or 1x1 intersections	*3ST, F+I*	*3ST, PDO*	*3SG, F+I*	*3SG, PDO*	*4ST, F+I*	*4ST, PDO*	*4SG, F+I*	*4SG, PDO*
Rear-end collision proportion	0.100	0.100	0.111	0.143	0.047	0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.571	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 and Suburban Arterial Intersections

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Major street name	MD 187 (Old Georgetown Rd)
Minor street name	Tuckerman Ln
Intersection number	7
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	5.446	4.195	9.641
Total-vehicle crashes	4.765	4.195	
Vehicle-pedestrian crashes	0.511		
Vehicle-bicycle crashes	0.170		

Combined CMF

	F+I	PDO
Total-vehicle crashes	0.639	0.639
Vehicle-pedestrian crashes	5.603	

Severity distribution for F+I crashes

K	A	B	C
0.030	0.287	1.440	3.689

Input Data	Value		Advisory Messages
Intersection Data			
Area type	Suburban		.
Number of legs	4		4SG intersection type
Traffic control type	Signalized		.
Lighting present?	Yes		.
Red-light cameras present?	No		.
Daily pedestrian volume crossing all legs (peds/day)	327		.
Maximum number of lanes crossed by a pedestrian	7		.
Number of bus stops within 1,000 ft of intersection	5		.
School(s) present within 1,000 ft of intersection?	Yes		.
Alcohol sales establishments within 1,000 ft	0		.
Street Data	*Major*	*Minor*	.
Street configuration	Two-way	Two-way	2x2 intersection configuration
Annual average daily traffic (AADT), veh/day	58152	21144	.
Number of through lanes	6	4	.
Number of approaches with left-turn lanes	2	2	.
Number of left-turn movements with protected phasing	1	2	.
Number of right-turn movements prohibited on red	0	1	.
Number of U-turn movements prohibited	0	0	.
Number of approaches with right-turn channelization	0	0	.

Calibration Factors	Value	Default Values
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

Manner of Collision Proportions

2x2 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.094	0.154	0.120	0.189	0.079	0.098	0.083	0.148
Angle colllision proportion	0.764	0.629	0.676	0.554	0.806	0.707	0.746	0.552
1x2 or 1x1 intersections	*3ST, F+I*	*3ST, PDO*	*3SG, F+I*	*3SG, PDO*	*4ST, F+I*	*4ST, PDO*	*4SG, F+I*	*4SG, PDO*
Rear-end collision proportion	0.100	0.100	0.111	0.143	0.047	0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.571	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	0.636	0.636
Right-turn-on-red	0.980	0.980
U-turn prohibition	1.000	1.000
Right-turn channelization	1.000	1.000
Number of lanes	1.126	1.126
Vehicle-pedestrian crash CMFs		
Bus stops	4.150	
Schools	1.350	
Alcohol sales establishments	1.000	

Safety Prediction Worksheet for Urban and Suburban Arterial Intersections

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Major street name	MD 355 Rockville Pike
Minor street name	Grosvenor Ln
Intersection number	1
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	3.569	2.847	6.416
Total-vehicle crashes	3.243	2.847	
Vehicle-pedestrian crashes	0.210		
Vehicle-bicycle crashes	0.116		

Combined CMF

	F+I	PDO
Total-vehicle crashes	0.528	0.528
Vehicle-pedestrian crashes	4.150	

Severity distribution for F+I crashes

K	A	B	C
0.020	0.197	0.994	2.357

Input Data

Input Data	Value	Advisory Messages
Intersection Data		
Area type	Suburban	.
Number of legs	4	4SG intersection type
Traffic control type	Signalized	.
Lighting present?	Yes	.
Red-light cameras present?	Yes	.
Daily pedestrian volume crossing all legs (peds/day)	156	.
Maximum number of lanes crossed by a pedestrian	7	.
Number of bus stops within 1,000 ft of intersection	4	.
School(s) present within 1,000 ft of intersection?	No	.
Alcohol sales establishments within 1,000 ft	0	.

Street Data	Major	Minor	
Street configuration	Two-way	Two-way	2x2 intersection configuration
Annual average daily traffic (AADT), veh/day	60115	9912	.
Number of through lanes	6	2	.
Number of approaches with left-turn lanes	0	2	.
Number of left-turn movements with protected phasing	0	2	.
Number of right-turn movements prohibited on red	0	0	.
Number of U-turn movements prohibited	2	0	.
Number of approaches with right-turn channelization	0	2	.

Calibration Factors

Calibration Factors	Value	Default Values
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

Manner of Collision Proportions

2x2 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.094	0.154	0.120	0.189	0.079	0.098	0.083	0.148
Angle colllision proportion	0.764	0.629	0.676	0.554	0.806	0.707	0.746	0.552

1x2 or 1x1 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.100	0.100	0.111	0.143	0.047	0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.571	0.822	0.706	0.837	0.733

Crash Modification Factors

Crash Modification Factors	F+I	PDO
Total-vehicle crash CMFs		
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		
Bus stops	4.150	
Schools	1.000	
Alcohol sales establishments	1.000	

Safety Prediction Worksheet for Two-Way Urban and Suburban Arterial Segments

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Street number	MD 355
Street name	Rockville Pike from Grosvenor Ln
Segment number	1
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	1.167	1.530	2.698
Multiple-vehicle crashes	0.785	1.130	
Single-vehicle crashes	0.321	0.400	
Vehicle-pedestrian crashes	0.040		
Vehicle-bicycle crashes	0.021		

Combined CMF

	F+I	PDO
Multiple-vehicle crashes	0.204	0.204
Single-vehicle crashes	0.840	0.840

Severity distribution for F+I crashes

K	A	B	C
0.018	0.092	0.358	0.699

Input Data		Value	Advisory Messages
Basic Roadway Data			
Area type		Suburban	.
Segment type		6D	.
Segment length, mi		0.46	.
Annual average daily traffic (AADT), veh/day		62005	.
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	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	.

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	Single	Multiple	Single
Lane width	1.000	1.000	1.000	1.000
Outside shoulder width	0.986	0.986	0.986	0.986
Median width	0.390	0.390	0.390	0.390
Median barrier	0.600	1.967	0.600	1.967
Highway-rail grade crossing	1.000	1.000	1.000	1.000
Major commercial driveways	0.932		0.932	
Major industrial driveways	0.989		0.989	
Minor driveways	0.959		0.959	
Automated speed enforcement	1.000	1.000	1.000	1.000
Roadside fixed objects		1.109		1.109

Safety Prediction Worksheet for Urban and Suburban Arterial Intersections

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Major street name	MD 355 Rockville Pike
Minor street name	Pooks Hill Rd
Intersection number	2
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	3.555	2.804	6.359
Total-vehicle crashes	3.295	2.804	
Vehicle-pedestrian crashes	0.083		
Vehicle-bicycle crashes	0.177		

Combined CMF

	F+I	PDO
Total-vehicle crashes	0.634	0.634
Vehicle-pedestrian crashes	4.150	

Severity distribution for F+I crashes

K	A	B	C
0.020	0.192	0.965	2.378

Input Data

Input Data	Value	Advisory Messages
Intersection Data		
Area type	Suburban	.
Number of legs	3	3SG intersection type
Traffic control type	Signalized	.
Lighting present?	Yes	.
Red-light cameras present?	No	.
Daily pedestrian volume crossing all legs (peds/day)	78	.
Maximum number of lanes crossed by a pedestrian	9	.
Number of bus stops within 1,000 ft of intersection	5	.
School(s) present within 1,000 ft of intersection?	No	.
Alcohol sales establishments within 1,000 ft	0	.

Street Data	*Major*	*Minor*	
Street configuration	Two-way	Two-way	2x2 intersection configuration
Annual average daily traffic (AADT), veh/day	73422	10149	.
Number of through lanes	6	2	.
Number of approaches with left-turn lanes	1	1	.
Number of left-turn movements with protected phasing	1	1	.
Number of right-turn movements prohibited on red	1	0	.
Number of U-turn movements prohibited	1	0	.
Number of approaches with right-turn channelization	0	1	.

Calibration Factors

Calibration Factors	Value	Default Values
Local calibration factor (C)	1.000	1.000
Adjustment factor for pedestrians for stop control (f_{ped})	0.051	0.051
Adjustment factor for bicyclists (f_{bike})	0.029	0.029
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

Manner of Collision Proportions

2x2 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.094	0.154	0.120	0.189	0.079	0.098	0.083	0.148
Angle colllision proportion	0.764	0.629	0.676	0.554	0.806	0.707	0.746	0.552
1x2 or 1x1 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.100	0.100	0.111	0.143	0.047	0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.571	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	0.980	0.980
U-turn prohibition	0.960	0.960
Right-turn channelization	1.000	1.000
Number of lanes	1.000	1.000
Vehicle-pedestrian crash CMFs		
Bus stops	4.150	
Schools	1.000	
Alcohol sales establishments	1.000	

Safety Prediction Worksheet for Two-Way Urban and Suburban Arterial Segments

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Street number	MD 355
Street name	Rockville Pike from Pooks Hill Rd
Segment number	2
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	0.733	0.960	1.693
Multiple-vehicle crashes	0.631	0.880	
Single-vehicle crashes	0.064	0.080	
Vehicle-pedestrian crashes	0.025		
Vehicle-bicycle crashes	0.013		

Combined CMF

	F+I	PDO
Multiple-vehicle crashes	1.020	1.020
Single-vehicle crashes	1.191	1.191

Severity distribution for F+I crashes

K	A	B	C
0.009	0.058	0.226	0.440

Input Data		Value	Advisory Messages
Basic Roadway Data			
Area type		Suburban	.
Segment type		6D	.
Segment length, mi		0.06	.
Annual average daily traffic (AADT), veh/day		73388	.
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	0	.
	Major industrial	0	.
	Minor	1	**17 minor 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 objects per mile.**
Average roadside fixed object offset, ft		8	.

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	Single	Multiple	Single
Lane width	1.022	1.022	1.022	1.022
Outside shoulder width	1.044	1.044	1.044	1.044
Median width	1.000	1.000	1.000	1.000
Median barrier	1.000	1.000	1.000	1.000
Highway-rail grade crossing	1.000	1.000	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	1.000	1.000	1.000	1.000
Roadside fixed objects		1.117		1.117

Safety Prediction Worksheet for Urban and Suburban Arterial Intersections

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Major street name	MD 355 Rockville Pike
Minor street name	Bellevue Dr/Alta Vista Rd
Intersection number	3
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	3.651	2.982	6.632
Total-vehicle crashes	3.441	2.982	
Vehicle-pedestrian crashes	0.088		
Vehicle-bicycle crashes	0.122		

Combined CMF

	F+I	PDO
Total-vehicle crashes	0.911	0.911
Vehicle-pedestrian crashes	4.150	

Severity distribution for F+I crashes

K	A	B	C
0.020	0.193	0.965	2.473

Input Data

Input Data	Value	Advisory Messages
Intersection Data		
Area type	Suburban	.
Number of legs	4	4SG intersection type
Traffic control type	Signalized	.
Lighting present?	Yes	.
Red-light cameras present?	No	.
Daily pedestrian volume crossing all legs (peds/day)	77	.
Maximum number of lanes crossed by a pedestrian	7	.
Number of bus stops within 1,000 ft of intersection	6	.
School(s) present within 1,000 ft of intersection?	No	.
Alcohol sales establishments within 1,000 ft	0	.

Street Data	*Major*	*Minor*	
Street configuration	Two-way	Two-way	2x2 intersection configuration
Annual average daily traffic (AADT), veh/day	69302	1352	.
Number of through lanes	6	2	.
Number of approaches with left-turn lanes	2	0	.
Number of left-turn movements with protected phasing	0	0	.
Number of right-turn movements prohibited on red	0	0	.
Number of U-turn movements prohibited	0	0	.
Number of approaches with right-turn channelization	0	0	.

Calibration Factors

Calibration Factors	Value	Default Values
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

Manner of Collision Proportions

2x2 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.094	0.154	0.120	0.189	0.079	0.098	0.083	0.148
Angle colllision proportion	0.764	0.629	0.676	0.554	0.806	0.707	0.746	0.552
1x2 or 1x1 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.100	0.100	0.111	0.143	0.047	0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.571	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	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		
Bus stops	4.150	
Schools	1.000	
Alcohol sales establishments	1.000	

Safety Prediction Worksheet for Urban and Suburban Arterial Intersections

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Major street name	Sam Eig Hwy
Minor street name	MD 119 Great Senecca Hwy
Intersection number	1
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	3.308	2.915	6.223
Total-vehicle crashes	3.109	2.915	
Vehicle-pedestrian crashes	0.024		
Vehicle-bicycle crashes	0.175		

Combined CMF

	F+I	PDO
Total-vehicle crashes	0.769	0.769
Vehicle-pedestrian crashes	1.000	

Severity distribution for F+I crashes

K	A	B	C
0.019	0.179	0.898	2.213

Input Data

Input Data	Value	Advisory Messages
Intersection Data		
Area type	Suburban	.
Number of legs	3	3SG intersection type
Traffic control type	Signalized	.
Lighting present?	Yes	.
Red-light cameras present?	No	.
Daily pedestrian volume crossing all legs (peds/day)	67	.
Maximum number of lanes crossed by a pedestrian	7	.
Number of bus stops within 1,000 ft of intersection	0	.
School(s) present within 1,000 ft of intersection?	No	.
Alcohol sales establishments within 1,000 ft	0	.

Street Data	Major	Minor	
Street configuration	Two-way	Two-way	2x2 intersection configuration
Annual average daily traffic (AADT), veh/day	37892	31000	Check minor volume.
Number of through lanes	6	4	.
Number of approaches with left-turn lanes	1	1	.
Number of left-turn movements with protected phasing	1	1	.
Number of right-turn movements prohibited on red	0	1	.
Number of U-turn movements prohibited	1	0	.
Number of approaches with right-turn channelization	0	1	.

Calibration Factors

Calibration Factors	Value	Default Values
Local calibration factor (C)	1.000	1.000
Adjustment factor for pedestrians for stop control (f_{ped})	0.051	0.051
Adjustment factor for bicyclists (f_{bike})	0.029	0.029
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

Manner of Collision Proportions

2x2 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.094	0.154	0.120	0.189	0.079	0.098	0.083	0.148
Angle colllision proportion	0.764	0.629	0.676	0.554	0.806	0.707	0.746	0.552

1x2 or 1x1 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.100	0.100	0.111	0.143	0.047	0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.571	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	0.980	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 CMFs		
Bus stops	1.000	
Schools	1.000	
Alcohol sales establishments	1.000	

Safety Prediction Worksheet for Two-Way Urban and Suburban Arterial Segments

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Street number	I-370
Street name	Sam Eig Hwy from MD 119 to Dia
Segment number	1
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	1.291	1.769	3.060
Multiple-vehicle crashes	0.749	1.173	
Single-vehicle crashes	0.472	0.596	
Vehicle-pedestrian crashes	0.045		
Vehicle-bicycle crashes	0.024		

Combined CMF

	F+I	PDO
Multiple-vehicle crashes	0.517	0.517
Single-vehicle crashes	2.273	2.273

Severity distribution for F+I crashes

K	A	B	C
0.030	0.101	0.393	0.767

Input Data		Value	Advisory Messages
Basic Roadway Data			
Area type		Suburban	.
Segment type		6D	.
Segment length, mi		0.31	.
Annual average daily traffic (AADT), veh/day		38803	.
Number of highway-rail grade crossings present		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		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	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	Single	Multiple	Single
Lane width	1.000	1.000	1.000	1.000
Outside shoulder width	1.014	1.014	1.014	1.014
Median width	0.972	0.972	0.972	0.972
Median barrier	0.600	1.967	0.600	1.967
Highway-rail grade crossing	1.000	1.000	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
Roadside fixed objects		1.172		1.172

Safety Prediction Worksheet for Urban and Suburban Arterial Intersections

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Major street name	Sam Eig Hwy
Minor street name	Diamondback Dr
Intersection number	2
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	6.367	5.378	11.745
Total-vehicle crashes	5.886	5.378	
Vehicle-pedestrian crashes	0.267		
Vehicle-bicycle crashes	0.214		

Combined CMF

	F+I	PDO
Total-vehicle crashes	0.937	0.937
Vehicle-pedestrian crashes	4.150	

Severity distribution for F+I crashes

K	A	B	C
0.028	0.266	1.541	4.533

Input Data

Input Data	Value	Advisory Messages
Intersection Data		
Area type	Suburban	.
Number of legs	4	4SG intersection type
Traffic control type	Signalized	.
Lighting present?	Yes	.
Red-light cameras present?	No	.
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?	No	.
Alcohol sales establishments within 1,000 ft	0	.

Street Data	Major	Minor	
Street configuration	Two-way	Two-way	2x2 intersection configuration
Annual average daily traffic (AADT), veh/day	38519	19460	.
Number of through lanes	6	4	.
Number of approaches with left-turn lanes	2	1	.
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	.

Calibration Factors

Calibration Factors	Value	Default Values
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

Manner of Collision Proportions

2x2 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.094	0.154	0.120	0.189	0.079	0.098	0.083	0.148
Angle colllision proportion	0.764	0.629	0.676	0.554	0.806	0.707	0.746	0.552

1x2 or 1x1 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.100	0.100	0.111	0.143	0.047	0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.571	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	0.636	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-pedestrian crash CMFs		
Bus stops	4.150	
Schools	1.000	
Alcohol sales establishments	1.000	

Safety Prediction Worksheet for Two-Way Urban and Suburban Arterial Segments

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Street number	I-370
Street name	Sam Eig Hwy from Diamondback
Segment number	2
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	0.272	0.372	0.644
Multiple-vehicle crashes	0.155	0.243	
Single-vehicle crashes	0.103	0.130	
Vehicle-pedestrian crashes	0.009		
Vehicle-bicycle crashes	0.005		

Combined CMF

	F+I	PDO
Multiple-vehicle crashes	0.557	0.557
Single-vehicle crashes	2.564	2.564

Severity distribution for F+I crashes

K	A	B	C
0.006	0.021	0.083	0.162

Input Data		*Value*	*Advisory Messages*
Basic Roadway Data			
Area type		Suburban	.
Segment type		6D	.
Segment length, mi		0.06	.
Annual average daily traffic (AADT), veh/day		38508	.
Number of highway-rail grade crossings present		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	*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	*Single*	*Multiple*	*Single*
Lane width	1.000	1.000	1.000	1.000
Outside shoulder width	1.014	1.014	1.014	1.014
Median width	1.047	1.047	1.047	1.047
Median barrier	0.600	1.967	0.600	1.967
Highway-rail grade crossing	1.000	1.000	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
Roadside fixed objects		1.228		1.228

Safety Prediction Worksheet for Urban and Suburban Arterial Intersections

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Major street name	Sam Eig Hwy
Minor street name	Fields Rd
Intersection number	3
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	3.531	3.044	6.575
Total-vehicle crashes	3.219	3.044	
Vehicle-pedestrian crashes	0.130		
Vehicle-bicycle crashes	0.182		

Combined CMF

	F+I	PDO
Total-vehicle crashes	0.857	0.857
Vehicle-pedestrian crashes	3.114	

Severity distribution for F+I crashes

K	A	B	C
0.020	0.191	0.958	2.362

Input Data	Value		Advisory Messages
Intersection Data			
Area type	Suburban		.
Number of legs	3		3SG intersection type
Traffic control type	Signalized		.
Lighting present?	Yes		.
Red-light cameras present?	No		.
Daily pedestrian volume crossing all legs (peds/day)	151		.
Maximum number of lanes crossed by a pedestrian	11		.
Number of bus stops within 1,000 ft of intersection	1		.
School(s) present within 1,000 ft of intersection?	No		.
Alcohol sales establishments within 1,000 ft	1		.
Street Data	*Major*	*Minor*	.
Street configuration	Two-way	Two-way	2x2 intersection configuration
Annual average daily traffic (AADT), veh/day	38177	18898	.
Number of through lanes	6	4	.
Number of approaches with left-turn lanes	1	1	.
Number of left-turn movements with protected phasing	1	1	.
Number of right-turn movements prohibited on red	1	1	.
Number of U-turn movements prohibited	1	1	.
Number of approaches with right-turn channelization	1	1	.

Calibration Factors	Value	Default Values
Local calibration factor (C)	1.000	1.000
Adjustment factor for pedestrians for stop control (f_{ped})	0.051	0.051
Adjustment factor for bicyclists (f_{bike})	0.029	0.029
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

Manner of Collision Proportions

2x2 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.094	0.154	0.120	0.189	0.079	0.098	0.083	0.148
Angle colllision proportion	0.764	0.629	0.676	0.554	0.806	0.707	0.746	0.552
1x2 or 1x1 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.100	0.100	0.111	0.143	0.047	0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.571	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		
Bus stops	2.780	
Schools	1.000	
Alcohol sales establishments	1.120	

Safety Prediction Worksheet for Urban and Suburban Arterial Intersections

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Major street name	Shady Grove Rd
Minor street name	Corporate Blvd
Intersection number	1
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	3.279	2.724	6.004
Total-vehicle crashes	2.982	2.724	
Vehicle-pedestrian crashes	0.189		
Vehicle-bicycle crashes	0.108		

Combined CMF

	F+I	PDO
Total-vehicle crashes	0.674	0.674
Vehicle-pedestrian crashes	4.648	

Severity distribution for F+I crashes

K	A	B	C
0.018	0.173	0.867	2.222

Input Data	*Value*	*Advisory Messages*
Intersection Data		
Area type	Suburban	.
Number of legs	4	4SG intersection type
Traffic control type	Signalized	.
Lighting present?	Yes	.
Red-light cameras present?	No	.
Daily pedestrian volume crossing all legs (peds/day)	161	.
Maximum number of lanes crossed by a pedestrian	7	.
Number of bus stops within 1,000 ft of intersection	4	.
School(s) present within 1,000 ft of intersection?	No	.
Alcohol sales establishments within 1,000 ft	1	.

Street Data	*Major*	*Minor*	.
Street configuration	Two-way	Two-way	2x2 intersection configuration
Annual average daily traffic (AADT), veh/day	38558	5317	.
Number of through lanes	6	2	.
Number of approaches with left-turn lanes	2	1	.
Number of left-turn movements with protected phasing	0	2	.
Number of right-turn movements prohibited on red	0	0	.
Number of U-turn movements prohibited	0	0	.
Number of approaches with right-turn channelization	0	0	.

Calibration Factors	*Value*	*Default Values*
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

Manner of Collision Proportions

2x2 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.094	0.154	0.120	0.189	0.079	0.098	0.083	0.148
Angle colllision proportion	0.764	0.629	0.676	0.554	0.806	0.707	0.746	0.552
1x2 or 1x1 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.100	0.100	0.111	0.143	0.047	0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.571	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	1.000	1.000
Number of lanes	1.000	1.000
Vehicle-pedestrian crash CMFs		
Bus stops	4.150	
Schools	1.000	
Alcohol sales establishments	1.120	

Safety Prediction Worksheet for Two-Way Urban and Suburban Arterial Segments

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Street number	Shady Grove Rd
Street name	Corporate Blvd to I-270 SB Ramp
Segment number	1
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	0.255	0.348	0.603
Multiple-vehicle crashes	0.143	0.224	
Single-vehicle crashes	0.098	0.124	
Vehicle-pedestrian crashes	0.009		
Vehicle-bicycle crashes	0.005		

Combined CMF

	F+I	PDO
Multiple-vehicle crashes	0.514	0.514
Single-vehicle crashes	2.446	2.446

Severity distribution for F+I crashes

K	A	B	C
0.004	0.020	0.078	0.153

Input Data		Value	Advisory Messages
Basic Roadway Data			
Area type		Suburban	.
Segment type		6D	.
Segment length, mi		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		6	**100 objects per mile.**
Average roadside fixed object offset, ft		10	.

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	Single	Multiple	Single
Lane width	1.022	1.022	1.022	1.022
Outside shoulder width	0.958	0.958	0.958	0.958
Median width	1.000	1.000	1.000	1.000
Median barrier	0.600	1.967	0.600	1.967
Highway-rail grade crossing	1.000	1.000	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
Roadside fixed objects		1.270		1.270

Safety Prediction Worksheet for Two-Way Urban and Suburban Arterial Segments

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Street number	Shady Grove Rd
Street name	I-270 SB Ramps to I-270 NB Ran
Segment number	2
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	0.354	0.483	0.837
Multiple-vehicle crashes	0.206	0.319	
Single-vehicle crashes	0.130	0.163	
Vehicle-pedestrian crashes	0.012		
Vehicle-bicycle crashes	0.007		

Combined CMF

	F+I	PDO
Multiple-vehicle crashes	0.514	0.514
Single-vehicle crashes	2.357	2.357

Severity distribution for F+I crashes

K	A	B	C
0.005	0.028	0.109	0.212

Input Data		Value	Advisory Messages
Basic Roadway Data			
Area type		Suburban	.
Segment type		6D	.
Segment length, mi		0.08	.
Annual average daily traffic (AADT), veh/day		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	.

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	Single	Multiple	Single
Lane width	1.000	1.000	1.000	1.000
Outside shoulder width	0.931	0.931	0.931	0.931
Median width	1.053	1.053	1.053	1.053
Median barrier	0.600	1.967	0.600	1.967
Highway-rail grade crossing	1.000	1.000	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
Roadside fixed objects		1.222		1.222

Safety Prediction Worksheet for Two-Way Urban and Suburban Arterial Segments

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Street number	Shady Grove Rd
Street name	I-270 NB Ramps to Choke Cherry
Segment number	3
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	0.666	0.913	1.580
Multiple-vehicle crashes	0.444	0.678	
Single-vehicle crashes	0.187	0.235	
Vehicle-pedestrian crashes	0.023		
Vehicle-bicycle crashes	0.012		

Combined CMF

	F+I	PDO
Multiple-vehicle crashes	0.731	0.731
Single-vehicle crashes	2.387	2.387

Severity distribution for F+I crashes

K	A	B	C
0.010	0.053	0.205	0.399

Input Data		*Value*	*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		0	.
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	.

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	*Single*	*Multiple*	*Single*
Lane width	1.000	1.000	1.000	1.000
Outside shoulder width	1.014	1.014	1.014	1.014
Median width	1.000	1.000	1.000	1.000
Median barrier	0.600	1.967	0.600	1.967
Highway-rail grade crossing	1.000	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	1.000	1.000
Roadside fixed objects		1.196		1.196

Safety Prediction Worksheet for Urban and Suburban Arterial Intersections

General Information

Analyst	TL
Agency	ATCS
Date	1/31/2022
Location	Montgomery County

Site Information

Major street name	Shady Grove Rd
Minor street name	Choke Cherry Rd
Intersection number	2
Analysis year	2045

Add to Totals worksheet | Restore equations | Reset input cells

Output Summary

Predicted crash frequency, crashes / year

	F+I	PDO	Total
Total crashes	4.290	3.529	7.819
Total-vehicle crashes	3.897	3.529	
Vehicle-pedestrian crashes	0.252		
Vehicle-bicycle crashes	0.141		

Combined CMF

	F+I	PDO
Total-vehicle crashes	0.731	0.731
Vehicle-pedestrian crashes	4.150	

Severity distribution for F+I crashes

K	A	B	C
0.023	0.226	1.134	2.906

Input Data

Input Data	Value	Advisory Messages
Intersection Data		
Area type	Suburban	.
Number of legs	4	4SG intersection type
Traffic control type	Signalized	.
Lighting present?	Yes	.
Red-light cameras present?	No	.
Daily pedestrian volume crossing all legs (peds/day)	237	.
Maximum number of lanes crossed by a pedestrian	8	.
Number of bus stops within 1,000 ft of intersection	2	.
School(s) present within 1,000 ft of intersection?	No	.
Alcohol sales establishments within 1,000 ft	0	.

Street Data	Major	Minor	
Street configuration	Two-way	Two-way	2x2 intersection configuration
Annual average daily traffic (AADT), veh/day	42473	9303	.
Number of through lanes	6	4	.
Number of approaches with left-turn lanes	2	1	.
Number of left-turn movements with protected phasing	0	2	.
Number of right-turn movements prohibited on red	0	0	.
Number of U-turn movements prohibited	0	0	.
Number of approaches with right-turn channelization	0		.

Calibration Factors

Calibration Factors	Value	Default Values
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

Manner of Collision Proportions

2x2 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.094	0.154	0.120	0.189	0.079	0.098	0.083	0.148
Angle colllision proportion	0.764	0.629	0.676	0.554	0.806	0.707	0.746	0.552

1x2 or 1x1 intersections	3ST, F+I	3ST, PDO	3SG, F+I	3SG, PDO	4ST, F+I	4ST, PDO	4SG, F+I	4SG, PDO
Rear-end collision proportion	0.100	0.100	0.111	0.143	0.047	0.065	0.030	0.059
Angle colllision proportion	0.300	0.250	0.889	0.571	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	1.000	1.000
Number of lanes	1.085	1.085
Vehicle-pedestrian crash CMFs		
Bus stops	4.150	
Schools	1.000	
Alcohol sales establishments	1.000	