

Appendix A
Round 1 - Safety Analysis

No-Build Alternative

Safety Performance Calculations

**No-Build Alternative
Segment Analysis
Willow Road – Sunset Ridge Road to Wagner Road**

Willow Road - Sunset Ridge Road to Wagner Road
2040 Predicted Crash Frequency
No-Build

	Predicted Crash Frequency (Crashes/Year)		
	Fatality-Injury	Property Damage Only	Total
Segment 1, Sunset Ridge to Old Willow	0.8	2.0	2.8
Intersection 1, Willow at Old Willow	1.6	3.1	4.7
Segment 2, Old Willow to Wagner	1.3	3.4	4.8
Total Crashes	3.7	8.5	12.3

Totals may not add due to rounding.

No-Build

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

General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Sunset Ridge to Old Willow Rd
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	2U
Length of segment, L (mi)		--	0.18
AADT (veh/day)		--	32,000
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)		--	1
Major industrial / institutional driveways (number)		--	1
Minor industrial / institutional driveways (number)		--	0
Major residential driveways (number)		--	0
Minor residential driveways (number)		--	5
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	56
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	23
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	1.11	1.00	1.00	1.00	1.11

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								
	a	b	from Table 12-3	from Equation 12-10		(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(6)*(7)*(8)	
Total	-15.22	1.68	0.84	1.637	1.000	1.637	1.11	1.00	1.821
Fatal and Injury (FI)	-16.22	1.66	0.65	0.489	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.287	0.469	1.11	1.00	0.522
Property Damage Only (PDO)	-15.62	1.69	0.87	1.217	$(5)_{TOTAL} - (5)_{FI}$ 0.713	1.167	1.11	1.00	1.299

Worksheet 1D -- Multiple-Vehicle Nondrivable 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	0.522	1.000	1.299	1.821
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.730	0.381	0.778	1.011	1.392
Head-on collision	0.068	0.036	0.004	0.005	0.041
Angle collision	0.085	0.044	0.079	0.103	0.147
Sideswipe, same direction	0.015	0.008	0.031	0.040	0.048
Sideswipe, opposite direction	0.073	0.038	0.055	0.071	0.110
Other multiple-vehicle collision	0.029	0.015	0.053	0.069	0.084

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 (6) from Worksheet 1B	Calibration Factor, Cr	Predicted N _{brsv}
	from Table 12-5								
	a	b							
Total	-5.47	0.56	0.81	0.253	1.000	0.253	1.11	1.00	0.281
Fatal and Injury (FI)	-3.96	0.23	0.50	0.037	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.154	0.039	1.11	1.00	0.043
Property Damage Only (PDO)	-6.51	0.64	0.87	0.205	(5) _{TOTAL} -(5) _{FI} 0.846	0.214	1.11	1.00	0.238

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	0.043	1.000	0.238	0.281
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.026	0.001	0.066	0.016	0.017
Collision with fixed object	0.723	0.031	0.759	0.181	0.212
Collision with other object	0.010	0.000	0.013	0.003	0.004
Other single-vehicle collision	0.241	0.010	0.162	0.039	0.049

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_i	Coefficient for traffic adjustment, t	Initial N_{brdwy}	Overdispersion parameter, k
		from Table 12-7	from Table 12-7	Equation 12-16 $n_j * N_i * (AADT/15,000)^t$	from Table 12-7
Major commercial	0	0.158	1.000	0.000	--
Minor commercial	1	0.050	1.000	0.107	
Major industrial/institutional	1	0.172	1.000	0.367	
Minor industrial/institutional	0	0.023	1.000	0.000	
Major residential	0	0.083	1.000	0.000	
Minor residential	5	0.016	1.000	0.171	
Other	0	0.025	1.000	0.000	
Total	--	--	--	0.644	

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	0.644	1.000	0.644	1.11	1.00	0.717
Fatal and injury (FI)	--	0.323	0.208	1.11	1.00	0.232
Property damage only (PDO)	--	0.677	0.436	1.11	1.00	0.485

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr}	Calibration factor, C_r	Predicted N_{pedr}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	1.821	0.281	0.717	2.820	0.005	1.00	0.014
Fatal and injury (FI)	--	--	--	--	--	1.00	0.014

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker}	Calibration factor, C_r	Predicted N_{biker}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	1.821	0.281	0.717	2.820	0.004	1.00	0.011
Fatal and injury (FI)	--	--	--	--	--	1.00	0.011

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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)	0.381	1.011	1.392
Head-on collisions (from Worksheet 1D)	0.036	0.005	0.041
Angle collisions (from Worksheet 1D)	0.044	0.103	0.147
Sideswipe, same direction (from Worksheet 1D)	0.008	0.040	0.048
Sideswipe, opposite direction (from Worksheet 1D)	0.038	0.071	0.110
Driveway-related collisions (from Worksheet 1H)	0.232	0.485	0.717
Other multiple-vehicle collision (from Worksheet 1D)	0.015	0.069	0.084
Subtotal	0.754	1.784	2.538
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.001	0.016	0.017
Collision with fixed object (from Worksheet 1F)	0.031	0.181	0.212
Collision with other object (from Worksheet 1F)	0.000	0.003	0.004
Other single-vehicle collision (from Worksheet 1F)	0.010	0.039	0.049
Collision with pedestrian (from Worksheet 1I)	0.014	0.000	0.014
Collision with bicycle (from Worksheet 1J)	0.011	0.000	0.011
Subtotal	0.069	0.238	0.307
Total	0.823	2.022	2.845

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Crash Severity Level	Predicted average crash frequency, $N_{\text{predicted}}$ (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)
	(Total) from Worksheet 1K		(2) / (3)
Total	2.8	0.18	15.8
Fatal and injury (FI)	0.8	0.18	4.6
Property damage only (PDO)	2.0	0.18	11.2

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections			
General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Intersection	at Old Willow
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)		--	3ST
AADT _{major} (veh/day)		--	32,000
AADT _{minor} (veh/day)		--	3,000
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	0
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]		--	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		--	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			1
Maximum number of lanes crossed by a pedestrian (n _{lanesx})		--	0
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
<i>CMF 1i</i>	<i>CMF 2i</i>	<i>CMF 3i</i>	<i>CMF 4i</i>	<i>CMF 5i</i>	<i>CMF 6i</i>	<i>CMF_{COMB}</i>
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	1.00	1.00	1.00

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 (7) from Worksheet 2B	Calibration Factor, C _i	Predicted N _{bimv}
	from Table 12-10			from Table 12-10	from Equation 12-21		(4) _{TOTAL} *(5)			(6)*(7)*(8)
	a	b	c							
Total	-13.36	1.11	0.41	0.80	4.209	1.000	4.209	1.00	1.00	4.209
Fatal and Injury (FI)	-14.01	1.16	0.30	0.69	1.530	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.326	1.372	1.00	1.00	1.372
Property Damage Only (PDO)	-15.38	1.20	0.51	0.77	3.163	$(5)_{TOTAL}-(5)_{FI}$ 0.674	2.837	1.00	1.00	2.837

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	1.372	1.000	2.837	4.209
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.421	0.578	0.440	1.248	1.826
Head-on collision	0.045	0.062	0.023	0.065	0.127
Angle collision	0.343	0.471	0.262	0.743	1.214
Sideswipe	0.126	0.173	0.040	0.113	0.286
Other multiple-vehicle collision	0.065	0.089	0.235	0.667	0.756

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 (7) from Worksheet 2B	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)			(6)*(7)*(8)
	a	b	c							
Total	-6.81	0.16	0.51	1.14	0.344	1.000	0.344	1.00	1.00	0.344
Fatal and Injury (FI)	--	--	--	--	0.107	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.294	0.101	1.00	1.00	0.101
Property Damage Only (PDO)	-8.36	0.25	0.55	1.29	0.256	$(5)_{TOTAL}-(5)_{FI}$ 0.706	0.243	1.00	1.00	0.243

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	0.243	0.344
		(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	0.004	0.005
Collision with fixed object	0.762	0.077	0.834	0.203	0.280
Collision with other object	0.090	0.009	0.092	0.022	0.031
Other single-vehicle collision	0.039	0.004	0.023	0.006	0.010
Single-vehicle noncollision	0.105	0.011	0.030	0.007	0.018

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Calibration factor, C _i	Predicted N _{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	4.209	0.344	4.553	0.021	1.00	0.096
Fatal and injury (FI)	--	--	--	--	1.00	0.096

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									
	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)	(6)	(7)
Crash Severity Level	Predicted N_{bimv}	Predicted N_{bisv}	Predicted N_{bi}	f_{bikei}	Calibration factor, C_i	Predicted N_{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	4.209	0.344	4.553	0.016	1.00	0.073
Fatal and injury (FI)	--	--	--	--	1.00	0.073

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)	0.578	1.248	1.826
Head-on collisions (from Worksheet 2D)	0.062	0.065	0.127
Angle collisions (from Worksheet 2D)	0.471	0.743	1.214
Sideswipe (from Worksheet 2D)	0.173	0.113	0.286
Other multiple-vehicle collision (from Worksheet 2D)	0.089	0.667	0.756
Subtotal	1.372	2.837	4.209
SINGLE-VEHICLE			
Collision with parked vehicle (from Worksheet 2F)	0.000	0.001	0.001
Collision with animal (from Worksheet 2F)	0.000	0.004	0.005
Collision with fixed object (from Worksheet 2F)	0.077	0.203	0.280
Collision with other object (from Worksheet 2F)	0.009	0.022	0.031
Other single-vehicle collision (from Worksheet 2F)	0.004	0.006	0.010
Single-vehicle noncollision (from Worksheet 2F)	0.011	0.007	0.018
Collision with pedestrian (from Worksheet 2G or 2I)	0.096	0.000	0.096
Collision with bicycle (from Worksheet 2J)	0.073	0.000	0.073
Subtotal	0.270	0.243	0.513
Total	1.642	3.080	4.721

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	4.7
Fatal and injury (FI)	1.6
Property damage only (PDO)	3.1

No-Build

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

General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Old Willow Rd. to Wagner
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	2U
Length of segment, L (mi)		--	0.42
AADT (veh/day)		--	30,000
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)		--	12
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	45
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	22
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	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								
	a	b	from Table 12-3	from Equation 12-10	(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(6)*(7)*(8)		
Total	-15.22	1.68	0.84	3.427	1.000	3.427	1.08	1.00	3.711
Fatal and Injury (FI)	-16.22	1.66	0.65	1.026	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.287	0.984	1.08	1.00	1.065
Property Damage Only (PDO)	-15.62	1.69	0.87	2.546	$(5)_{TOTAL} - (5)_{FI}$ 0.713	2.443	1.08	1.00	2.645

No-Build

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	1.065	1.000	2.645	3.711
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.730	0.778	0.778	2.058	2.836
Head-on collision	0.068	0.072	0.004	0.011	0.083
Angle collision	0.085	0.091	0.079	0.209	0.300
Sideswipe, same direction	0.015	0.016	0.031	0.082	0.098
Sideswipe, opposite direction	0.073	0.078	0.055	0.145	0.223
Other multiple-vehicle collision	0.029	0.031	0.053	0.140	0.171

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 (6) from Worksheet 1B	Calibration Factor, Cr	Predicted N _{brsv}
	from Table 12-5		from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)			(6)*(7)*(8)
	a	b							
Total	-5.47	0.56	0.81	0.569	1.000	0.569	1.08	1.00	0.616
Fatal and Injury (FI)	-3.96	0.23	0.50	0.086	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.158	0.090	1.08	1.00	0.097
Property Damage Only (PDO)	-6.51	0.64	0.87	0.459	(5) _{TOTAL} -(5) _{FI} 0.842	0.479	1.08	1.00	0.519

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	0.097	1.000	0.519	0.616
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.026	0.003	0.066	0.034	0.037
Collision with fixed object	0.723	0.070	0.759	0.394	0.464
Collision with other object	0.010	0.001	0.013	0.007	0.008
Other single-vehicle collision	0.241	0.023	0.162	0.084	0.107

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_i from Table 12-7	Coefficient for traffic adjustment, t from Table 12-7	Initial N_{brdwy}	Overdispersion parameter, k from Table 12-7
				Equation 12-16 $n_j * N_j * (AADT/15,000)^t$	
Major commercial	0	0.158	1.000	0.000	--
Minor commercial	0	0.050	1.000	0.000	
Major industrial/institutional	0	0.172	1.000	0.000	
Minor industrial/institutional	0	0.023	1.000	0.000	
Major residential	0	0.083	1.000	0.000	
Minor residential	12	0.016	1.000	0.384	
Other	0	0.025	1.000	0.000	
Total	--	--	--	0.384	

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}) from Table 12-7	Adjusted N_{brdwy} (2) _{TOTAL} * (3)	Combined CMFs (6) from Worksheet 1B	Calibration factor, C_r	Predicted N_{brdwy} (4)*(5)*(6)
	(5) _{TOTAL} from Worksheet 1G					
Total	0.384	1.000	0.384	1.08	1.00	0.416
Fatal and injury (FI)	--	0.323	0.124	1.08	1.00	0.134
Property damage only (PDO)	--	0.677	0.260	1.08	1.00	0.282

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr} from Table 12-8	Calibration factor, C_r	Predicted N_{pedr} (5)*(6)*(7)
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			
Total	3.711	0.616	0.416	4.742	0.005	1.00	0.024
Fatal and injury (FI)	--	--	--	--	--	1.00	0.024

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker} from Table 12-9	Calibration factor, C_r	Predicted N_{biker} (5)*(6)*(7)
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			
Total	3.711	0.616	0.416	4.742	0.004	1.00	0.019
Fatal and injury (FI)	--	--	--	--	--	1.00	0.019

No-Build

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)	0.778	2.058	2.836
Head-on collisions (from Worksheet 1D)	0.072	0.011	0.083
Angle collisions (from Worksheet 1D)	0.091	0.209	0.300
Sideswipe, same direction (from Worksheet 1D)	0.016	0.082	0.098
Sideswipe, opposite direction (from Worksheet 1D)	0.078	0.145	0.223
Driveway-related collisions (from Worksheet 1H)	0.134	0.282	0.416
Other multiple-vehicle collision (from Worksheet 1D)	0.031	0.140	0.171
Subtotal	1.200	2.927	4.126
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.003	0.034	0.037
Collision with fixed object (from Worksheet 1F)	0.070	0.394	0.464
Collision with other object (from Worksheet 1F)	0.001	0.007	0.008
Other single-vehicle collision (from Worksheet 1F)	0.023	0.084	0.107
Collision with pedestrian (from Worksheet 1I)	0.024	0.000	0.024
Collision with bicycle (from Worksheet 1J)	0.019	0.000	0.019
Subtotal	0.140	0.519	0.658
Total	1.339	3.445	4.785

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Crash Severity Level	Predicted average crash frequency, $N_{\text{predicted rs}}$ (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)
	(Total) from Worksheet 1K		(2) / (3)
Total	4.8	0.42	11.4
Fatal and injury (FI)	1.3	0.42	3.2
Property damage only (PDO)	3.4	0.42	8.2

**No-Build Alternative
Intersection Analysis
Willow Road/Sunset Ridge Road**

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections		
General Information		Location Information
Analyst	R. Jacox	Roadway
Agency or Company	TranSystems	Intersection
Date Performed	03/10/11	Jurisdiction
		Analysis Year
		Willow Road at Sunset Ridge Road
		IDOT 2040
Input Data	Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)	--	4SG
AAADT _{major} (veh/day)	--	37,000
AAADT _{minor} (veh/day)	--	12,000
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	4
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	1
Intersection red light cameras (present/not present)	Not Present	Not Present
Sum of all pedestrian crossing volumes (PedVol) -- Signalized intersections only		110
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	1
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
<i>CMF 1i</i>	<i>CMF 2i</i>	<i>CMF 3i</i>	<i>CMF 4i</i>	<i>CMF 5i</i>	<i>CMF 6i</i>	<i>CMF_{COMB}</i>
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	0.96	0.98	1.00	1.00	0.62

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	Calibration Factor, C_i	Predicted N_{bimv}
	from Table 12-10									
	a	b	c							
Total	-10.99	1.07	0.23	0.39	11.306	1.000	11.306	0.62	1.00	7.020
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	3.813	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.349	3.942	0.62	1.00	2.448
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	7.123	$(5)_{TOTAL}-(5)_{FI}$ 0.651	7.364	0.62	1.00	4.572

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/yea)	Predicted $N_{bimv (TOTAL)}$ (crashes/year)
	from Table 12-11	(9) _{FI} from Worksheet 2C	from Table 12-11	(9) _{PDO} from Worksheet	(9) _{PDO} from Worksheet 2C
Total	1.000	2.448	1.000	4.572	7.020
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	$(3)+(5)$
Rear-end collision	0.450	1.101	0.483	2.208	3.310
Head-on collision	0.049	0.120	0.030	0.137	0.257
Angle collision	0.347	0.849	0.244	1.116	1.965
Sideswipe	0.099	0.242	0.032	0.146	0.389
Other multiple-vehicle collision	0.055	0.135	0.211	0.965	1.099

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_{bisv}	Combined	Calibration Factor, C_i	Predicted N_{bisv}
	from Table 12-12									
	a	b	c							
Total	-10.21	0.68	0.27	0.36	0.594	1.000	0.594	0.62	1.00	0.369
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.135	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.229	0.136	0.62	1.00	0.084
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.455	$(5)_{TOTAL}-(5)_{FI}$ 0.771	0.458	0.62	1.00	0.284

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/yea)	Predicted N _{bisv (TOTAL)} (crashes/year)
	from Table 12-13	(9) _{FI} from Worksheet 2E	from Table 12-13	(9) _{PDO} from Worksheet	(9) _{PDO} from Worksheet 2E
Total	1.000	0.084	1.000	0.284	0.369
		(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	0.063	0.870	0.247	0.310
Collision with other object	0.072	0.006	0.070	0.020	0.026
Other single-vehicle collision	0.040	0.003	0.023	0.007	0.010
Single-vehicle noncollision	0.141	0.012	0.034	0.010	0.022

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Calibration factor, C _i	Predicted N _{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	--	--	--	--	1.00	--
Fatal and injury (FI)	--	--	--	--	1.00	--

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	1.35	1.00	3.75

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 r, k	N _{pedbase} from Equation 12-29	Combined CMF (4) from Worksheet 2H	Calibration factor, C _i	Predicted N _{pedi} (4)*(5)*(6)
	from Table 12-14									
	a	b	c	d	e					
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.040	3.75	1.00	0.149
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	0.149

Worksheet 2J -- Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N_{bimv}	Predicted N_{bisv}	Predicted N_{bi}	f_{bikei}	Calibration factor, C_i	Predicted N_{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	7.020	0.369	7.389	0.015	1.00	0.111
Fatal and injury (FI)	--	--	--	--	1.00	0.111

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)	1.101	2.208	3.310
Head-on collisions (from Worksheet 2D)	0.120	0.137	0.257
Angle collisions (from Worksheet 2D)	0.849	1.116	1.965
Sideswipe (from Worksheet 2D)	0.242	0.146	0.389
Other multiple-vehicle collision (from Worksheet 2D)	0.135	0.965	1.099
Subtotal	2.448	4.572	7.020
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)	0.063	0.247	0.310
Collision with other object (from Worksheet 2F)	0.006	0.020	0.026
Other single-vehicle collision (from Worksheet 2F)	0.003	0.007	0.010
Single-vehicle noncollision (from Worksheet 2F)	0.012	0.010	0.022
Collision with pedestrian (from Worksheet 2G or 2I)	0.149	0.000	0.149
Collision with bicycle (from Worksheet 2J)	0.111	0.000	0.111
Subtotal	0.344	0.284	0.628
Total	2.792	4.857	7.648

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	7.6
Fatal and injury (FI)	2.8
Property damage only (PDO)	4.9

Alternative 1
Willow Road No-Build Plus
Safety Performance Calculations

Alternative 1
Segment Analysis
Willow Road – Sunset Ridge Road to Wagner Road

Willow Road - Sunset Ridge Road to Wagner Road
2040 Predicted Crash Frequency
Alternative 1 (No-Build Plus)

	Predicted Crash Frequency (Crashes/Year)		
	Fatality-Injury	Property Damage Only	Total
Segment 1, Sunset Ridge to Old Willow	0.8	2.0	2.8
Segment 2, Old Willow to Wagner	1.5	3.8	5.2
Total Crashes	2.3	5.8	8.0

Totals may not add due to rounding.

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

General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Sunset Ridge to Old Willow Rd
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	2U
Length of segment, L (mi)		--	0.18
AADT (veh/day)		--	32,000
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)		--	1
Major industrial / institutional driveways (number)		--	1
Minor industrial / institutional driveways (number)		--	0
Major residential driveways (number)		--	0
Minor residential driveways (number)		--	4
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	56
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	23
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	1.11	1.00	1.00	1.00	1.11

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								
	a	b	from Table 12-3	from Equation 12-10	(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(6)*(7)*(8)		
Total	-15.22	1.68	0.84	1.637	1.000	1.637	1.11	1.00	1.821
Fatal and Injury (FI)	-16.22	1.66	0.65	0.489	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.287	0.469	1.11	1.00	0.522
Property Damage Only (PDO)	-15.62	1.69	0.87	1.217	$(5)_{TOTAL} - (5)_{FI}$ 0.713	1.167	1.11	1.00	1.299

Worksheet 1D -- Multiple-Vehicle Nondrivable 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		0.522	1.000	1.299	1.821
			(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.730		0.381	0.778	1.011	1.392
Head-on collision	0.068		0.036	0.004	0.005	0.041
Angle collision	0.085		0.044	0.079	0.103	0.147
Sideswipe, same direction	0.015		0.008	0.031	0.040	0.048
Sideswipe, opposite direction	0.073		0.038	0.055	0.071	0.110
Other multiple-vehicle collision	0.029		0.015	0.053	0.069	0.084

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 (6) from Worksheet 1B	Calibration Factor, Cr	Predicted N _{brsv}
	from Table 12-5		from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)			(6)*(7)*(8)
	a	b							
Total	-5.47	0.56	0.81	0.253	1.000	0.253	1.11	1.00	0.281
Fatal and Injury (FI)	-3.96	0.23	0.50	0.037	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.154	0.039	1.11	1.00	0.043
Property Damage Only (PDO)	-6.51	0.64	0.87	0.205	(5) _{TOTAL} -(5) _{FI} 0.846	0.214	1.11	1.00	0.238

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	0.043	1.000	0.238	0.281
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.026	0.001	0.066	0.016	0.017
Collision with fixed object	0.723	0.031	0.759	0.181	0.212
Collision with other object	0.010	0.000	0.013	0.003	0.004
Other single-vehicle collision	0.241	0.010	0.162	0.039	0.049

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_i	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	0.158	1.000	0.000	--
Minor commercial	1	0.050	1.000	0.107	
Major industrial/institutional	1	0.172	1.000	0.367	
Minor industrial/institutional	0	0.023	1.000	0.000	
Major residential	0	0.083	1.000	0.000	
Minor residential	4	0.016	1.000	0.137	
Other	0	0.025	1.000	0.000	
Total	--	--	--	0.610	

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	0.610	1.000	0.610	1.11	1.00	0.679
Fatal and injury (FI)	--	0.323	0.197	1.11	1.00	0.219
Property damage only (PDO)	--	0.677	0.413	1.11	1.00	0.460

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr}	Calibration factor, C_r	Predicted N_{pedr}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	1.821	0.281	0.679	2.782	0.005	1.00	0.014
Fatal and injury (FI)	--	--	--	--	--	1.00	0.014

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker}	Calibration factor, C_r	Predicted N_{biker}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	1.821	0.281	0.679	2.782	0.004	1.00	0.011
Fatal and injury (FI)	--	--	--	--	--	1.00	0.011

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 1D and 1F; (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)	0.381	1.011	1.392
Head-on collisions (from Worksheet 1D)	0.036	0.005	0.041
Angle collisions (from Worksheet 1D)	0.044	0.103	0.147
Sideswipe, same direction (from Worksheet 1D)	0.008	0.040	0.048
Sideswipe, opposite direction (from Worksheet 1D)	0.038	0.071	0.110
Driveway-related collisions (from Worksheet 1H)	0.219	0.460	0.679
Other multiple-vehicle collision (from Worksheet 1D)	0.015	0.069	0.084
Subtotal	0.742	1.759	2.500
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.001	0.016	0.017
Collision with fixed object (from Worksheet 1F)	0.031	0.181	0.212
Collision with other object (from Worksheet 1F)	0.000	0.003	0.004
Other single-vehicle collision (from Worksheet 1F)	0.010	0.039	0.049
Collision with pedestrian (from Worksheet 1I)	0.014	0.000	0.014
Collision with bicycle (from Worksheet 1J)	0.011	0.000	0.011
Subtotal	0.068	0.238	0.306
Total	0.810	1.997	2.807

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	2.8	0.18	15.6
Fatal and injury (FI)	0.8	0.18	4.5
Property damage only (PDO)	2.0	0.18	11.1

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

General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Old Willow Rd. to Wagner
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	2U
Length of segment, L (mi)		--	0.42
AADT (veh/day)		--	32,000
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)		--	11
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	45
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	22
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	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								
	a	b	from Table 12-3	from Equation 12-10	(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(6)*(7)*(8)		
Total	-15.22	1.68	0.84	3.819	1.000	3.819	1.08	1.00	4.136
Fatal and Injury (FI)	-16.22	1.66	0.65	1.142	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.287	1.095	1.08	1.00	1.186
Property Damage Only (PDO)	-15.62	1.69	0.87	2.840	$(5)_{TOTAL} - (5)_{FI}$ 0.713	2.724	1.08	1.00	2.950

Worksheet 1D -- Multiple-Vehicle Nondrivable 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	1.186	1.000	2.950	4.136
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.730	0.866	0.778	2.295	3.161
Head-on collision	0.068	0.081	0.004	0.012	0.092
Angle collision	0.085	0.101	0.079	0.233	0.334
Sideswipe, same direction	0.015	0.018	0.031	0.091	0.109
Sideswipe, opposite direction	0.073	0.087	0.055	0.162	0.249
Other multiple-vehicle collision	0.029	0.034	0.053	0.156	0.191

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 (6) from Worksheet 1B	Calibration Factor, Cr	Predicted N _{brsv}
	from Table 12-5		from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)			(6)*(7)*(8)
	a	b							
Total	-5.47	0.56	0.81	0.590	1.000	0.590	1.08	1.00	0.638
Fatal and Injury (FI)	-3.96	0.23	0.50	0.087	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.154	0.091	1.08	1.00	0.098
Property Damage Only (PDO)	-6.51	0.64	0.87	0.478	(5) _{TOTAL} -(5) _{FI} 0.846	0.499	1.08	1.00	0.540

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	0.098	1.000	0.540	0.638
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.026	0.003	0.066	0.036	0.038
Collision with fixed object	0.723	0.071	0.759	0.410	0.481
Collision with other object	0.010	0.001	0.013	0.007	0.008
Other single-vehicle collision	0.241	0.024	0.162	0.087	0.111

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_i from Table 12-7	Coefficient for traffic adjustment, t from Table 12-7	Initial N_{brdwy}	Overdispersion parameter, k from Table 12-7
				Equation 12-16 $n_j * N_i * (AADT/15,000)^t$	
Major commercial	0	0.158	1.000	0.000	--
Minor commercial	0	0.050	1.000	0.000	
Major industrial/institutional	0	0.172	1.000	0.000	
Minor industrial/institutional	0	0.023	1.000	0.000	
Major residential	0	0.083	1.000	0.000	
Minor residential	11	0.016	1.000	0.375	
Other	0	0.025	1.000	0.000	
Total	--	--	--	0.375	

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}) from Table 12-7	Adjusted N_{brdwy} (2) _{TOTAL} * (3)	Combined CMFs (6) from Worksheet 1B	Calibration factor, C_r	Predicted N_{brdwy}
	(5) _{TOTAL} from Worksheet 1G	(4)* f_{dwy}	(4)* f_{dwy}	(4)* f_{dwy}		(4)*(5)*(6)
Total	0.375	1.000	0.375	1.08	1.00	0.407
Fatal and injury (FI)	--	0.323	0.121	1.08	1.00	0.131
Property damage only (PDO)	--	0.677	0.254	1.08	1.00	0.275

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr} from Table 12-8	Calibration factor, C_r	Predicted N_{pedr}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	(5)*(6)*(7)		
Total	4.136	0.638	0.407	5.181	0.005	1.00	0.026
Fatal and injury (FI)	--	--	--	--	--	1.00	0.026

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker} from Table 12-9	Calibration factor, C_r	Predicted N_{biker}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	(5)*(6)*(7)		
Total	4.136	0.638	0.407	5.181	0.004	1.00	0.021
Fatal and injury (FI)	--	--	--	--	--	1.00	0.021

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 1D and 1F; (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)	0.866	2.295	3.161
Head-on collisions (from Worksheet 1D)	0.081	0.012	0.092
Angle collisions (from Worksheet 1D)	0.101	0.233	0.334
Sideswipe, same direction (from Worksheet 1D)	0.018	0.091	0.109
Sideswipe, opposite direction (from Worksheet 1D)	0.087	0.162	0.249
Driveway-related collisions (from Worksheet 1H)	0.131	0.275	0.407
Other multiple-vehicle collision (from Worksheet 1D)	0.034	0.156	0.191
Subtotal	1.317	3.225	4.542
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.003	0.036	0.038
Collision with fixed object (from Worksheet 1F)	0.071	0.410	0.481
Collision with other object (from Worksheet 1F)	0.001	0.007	0.008
Other single-vehicle collision (from Worksheet 1F)	0.024	0.087	0.111
Collision with pedestrian (from Worksheet 1I)	0.026	0.000	0.026
Collision with bicycle (from Worksheet 1J)	0.021	0.000	0.021
Subtotal	0.145	0.540	0.685
Total	1.462	3.765	5.227

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)
Crash Severity Level	Predicted average crash frequency, $N_{\text{predicted}}$ (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)
	(Total) from Worksheet 1K		(2) / (3)
Total	5.2	0.42	12.4
Fatal and injury (FI)	1.5	0.42	3.5
Property damage only (PDO)	3.8	0.42	9.0

**Alternative 1
Intersection Analysis
Willow Road/Sunset Ridge Road**

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections		
General Information		Location Information
Analyst	R. Jacox	Roadway
Agency or Company	TranSystems	Intersection
Date Performed	03/10/11	Jurisdiction
		Analysis Year
		Willow Road at Sunset Ridge Road
		IDOT 2040
Input Data	Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)	--	4SG
AADT _{major} (veh/day)	--	37,000
AADT _{minor} (veh/day)	--	12,000
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	4
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	1
Intersection red light cameras (present/not present)	Not Present	Not Present
Sum of all pedestrian crossing volumes (PedVol) -- Signalized intersections only		110
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	1
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
<i>CMF 1i</i>	<i>CMF 2i</i>	<i>CMF 3i</i>	<i>CMF 4i</i>	<i>CMF 5i</i>	<i>CMF 6i</i>	<i>CMF_{COMB}</i>
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	0.96	0.98	1.00	1.00	0.62

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	Calibration Factor, C_i	Predicted N_{bimv}
	from Table 12-10									
	a	b	c							
Total	-10.99	1.07	0.23	0.39	11.306	1.000	11.306	0.62	1.00	7.020
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	3.813	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.349	3.942	0.62	1.00	2.448
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	7.123	$(5)_{TOTAL}-(5)_{FI}$ 0.651	7.364	0.62	1.00	4.572

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/yea)	Predicted $N_{bimv (TOTAL)}$ (crashes/year)
	from Table 12-11	(9) _{FI} from Worksheet 2C	from Table 12-11	(9) _{PDO} from Worksheet	(9) _{PDO} from Worksheet 2C
Total	1.000	2.448	1.000	4.572	7.020
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	$(3)+(5)$
Rear-end collision	0.450	1.101	0.483	2.208	3.310
Head-on collision	0.049	0.120	0.030	0.137	0.257
Angle collision	0.347	0.849	0.244	1.116	1.965
Sideswipe	0.099	0.242	0.032	0.146	0.389
Other multiple-vehicle collision	0.055	0.135	0.211	0.965	1.099

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_{bisv}	Combined	Calibration Factor, C_i	Predicted N_{bisv}
	from Table 12-12									
	a	b	c							
Total	-10.21	0.68	0.27	0.36	0.594	1.000	0.594	0.62	1.00	0.369
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.135	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.229	0.136	0.62	1.00	0.084
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.455	$(5)_{TOTAL}-(5)_{FI}$ 0.771	0.458	0.62	1.00	0.284

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/yea)	Predicted N _{bisv (TOTAL)} (crashes/year)
	from Table 12-13	(9) _{FI} from Worksheet 2E	from Table 12-13	(9) _{PDO} from Worksheet	(9) _{PDO} from Worksheet 2E
Total	1.000	0.084	1.000	0.284	0.369
		(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	0.063	0.870	0.247	0.310
Collision with other object	0.072	0.006	0.070	0.020	0.026
Other single-vehicle collision	0.040	0.003	0.023	0.007	0.010
Single-vehicle noncollision	0.141	0.012	0.034	0.010	0.022

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Calibration factor, C _i	Predicted N _{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	--	--	--	--	1.00	--
Fatal and injury (FI)	--	--	--	--	1.00	--

Worksheet 2H -- Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections				
(1)	(2)	(3)	(4)	(5)
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	W/DW Ped Signals with Countdown Ped Signals	Combined CMF
CMF _{1p}	CMF _{2p}	CMF _{3p}	CMF _{4p}	
from Table 12-28	from Table 12-29	from Table 12-30	cmfclearinghouse.org	
2.78	1.35	1.00	0.75	(1)*(2)*(3)*(4) 2.81

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 r, k	N _{pedbase} from Equation 12-29	Combined CMF (4) from Worksheet 2H	Calibration factor, C _i	Predicted N _{pedi} (4)*(5)*(6)
	from Table 12-14									
	a	b	c	d	e					
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.040	2.81	1.00	0.112
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	0.112

Worksheet 2J -- Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N_{bimv}	Predicted N_{bisv}	Predicted N_{bi}	f_{bikei}	Calibration factor, C_i	Predicted N_{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	7.020	0.369	7.389	0.015	1.00	0.111
Fatal and injury (FI)	--	--	--	--	1.00	0.111

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)	1.101	2.208	3.310
Head-on collisions (from Worksheet 2D)	0.120	0.137	0.257
Angle collisions (from Worksheet 2D)	0.849	1.116	1.965
Sideswipe (from Worksheet 2D)	0.242	0.146	0.389
Other multiple-vehicle collision (from Worksheet 2D)	0.135	0.965	1.099
Subtotal	2.448	4.572	7.020
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)	0.063	0.247	0.310
Collision with other object (from Worksheet 2F)	0.006	0.020	0.026
Other single-vehicle collision (from Worksheet 2F)	0.003	0.007	0.010
Single-vehicle noncollision (from Worksheet 2F)	0.012	0.010	0.022
Collision with pedestrian (from Worksheet 2G or 2I)	0.112	0.000	0.112
Collision with bicycle (from Worksheet 2J)	0.111	0.000	0.111
Subtotal	0.307	0.284	0.591
Total	2.754	4.857	7.611

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	7.6
Fatal and injury (FI)	2.8
Property damage only (PDO)	4.9

Alternative 2
Willow Road 2-Lane with Median
Safety Performance Calculations

Alternative 2
Segment Analysis
Willow Road – Sunset Ridge Road to Wagner Road

Willow Road - Sunset Ridge Road to Wagner Road
2040 Predicted Crash Frequency
Alternative 2 (2-Lane with Median)

	Predicted Crash Frequency (Crashes/Year)		
	Fatality-Injury	Property Damage Only	Total
Segment 1, Sunset Ridge to Old Willow	0.7	1.5	2.2
Segment 2, Old Willow to Wagner	1.4	3.0	4.4
Total Crashes	2.1	4.5	6.6

Totals may not add due to rounding.

Worksheet 1A -- General Information and Input Data for Urban and Suburban Roadway Segments			
General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Sunset Ridge to Old Willow Rd
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	3T
Length of segment, L (mi)		--	0.18
AADT (veh/day)		--	31,000
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)		--	1
Major industrial / institutional driveways (number)		--	1
Minor industrial / institutional driveways (number)		--	0
Major residential driveways (number)		--	0
Minor residential driveways (number)		--	4
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	11
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	7
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	1.01	1.00	1.00	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 Equation 12-10	(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(6)*(7)*(8)
	a	b											
Total	-12.40	1.41	0.66	1.595	1.000	1.595	1.01	1.00	1.605				
Fatal and Injury (FI)	-16.45	1.69	0.59	0.503	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.315	0.502	1.01	1.00	0.506				
Property Damage Only (PDO)	-11.95	1.33	0.59	1.094	$(5)_{TOTAL} - (5)_{FI}$ 0.685	1.093	1.01	1.00	1.100				

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	0.506	1.000	1.100	1.605
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.845	0.427	0.842	0.926	1.353
Head-on collision	0.034	0.017	0.020	0.022	0.039
Angle collision	0.069	0.035	0.020	0.022	0.057
Sideswipe, same direction	0.001	0.001	0.078	0.086	0.086
Sideswipe, opposite direction	0.017	0.009	0.020	0.022	0.031
Other multiple-vehicle collision	0.034	0.017	0.020	0.022	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}
	a	b	from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)	(6) from Worksheet 1B		(6)*(7)*(8)
Total	-5.74	0.54	1.37	0.154	1.000	0.154	1.01	1.00	0.155
Fatal and Injury (FI)	-6.37	0.47	1.06	0.040	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.267	0.041	1.01	1.00	0.041
Property Damage Only (PDO)	-6.29	0.56	1.93	0.109	(5) _{TOTAL} -(5) _{FI} 0.733	0.113	1.01	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	0.688	0.028	0.963	0.109	0.138
Collision with other object	0.001	0.000	0.001	0.000	0.000
Other single-vehicle collision	0.310	0.013	0.035	0.004	0.017

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_i from Table 12-7	Coefficient for traffic adjustment, t from Table 12-7	Initial N_{brdwy}	Overdispersion parameter, k from Table 12-7	
				Equation 12-16 $n_j * N_j * (AADT/15,000)^t$		
Major commercial	0	0.102	1.000	0.000	--	
Minor commercial	1	0.032	1.000	0.066		
Major industrial/institutional	1	0.110	1.000	0.227		
Minor industrial/institutional	0	0.015	1.000	0.000		
Major residential	0	0.053	1.000	0.000		
Minor residential	4	0.010	1.000	0.083		
Other	0	0.016	1.000	0.000		
Total	--	--	--	0.376		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}) from Table 12-7	Adjusted N_{brdwy} (2) _{TOTAL} * (3)	Combined CMFs (6) from Worksheet 1B	Calibration factor, C_r	Predicted N_{brdwy} (4)*(5)*(6)
	(5) _{TOTAL} from Worksheet 1G					
Total	0.376	1.000	0.376	1.01	1.00	0.379
Fatal and injury (FI)	--	0.243	0.091	1.01	1.00	0.092
Property damage only (PDO)	--	0.757	0.285	1.01	1.00	0.287

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr} from Table 12-8	Calibration factor, C_r	Predicted N_{pedr} (5)*(6)*(7)
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			
Total	1.605	0.155	0.379	2.139	0.013	1.00	0.028
Fatal and injury (FI)	--	--	--	--	--	1.00	0.028

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker} from Table 12-9	Calibration factor, C_r	Predicted N_{biker} (5)*(6)*(7)
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			
Total	1.605	0.155	0.379	2.139	0.007	1.00	0.015
Fatal and injury (FI)	--	--	--	--	--	1.00	0.015

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)	0.427	0.926	1.353
Head-on collisions (from Worksheet 1D)	0.017	0.022	0.039
Angle collisions (from Worksheet 1D)	0.035	0.022	0.057
Sideswipe, same direction (from Worksheet 1D)	0.001	0.086	0.086
Sideswipe, opposite direction (from Worksheet 1D)	0.009	0.022	0.031
Driveway-related collisions (from Worksheet 1H)	0.092	0.287	0.379
Other multiple-vehicle collision (from Worksheet 1D)	0.017	0.022	0.039
Subtotal	0.598	1.386	1.984
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 1F)	0.028	0.109	0.138
Collision with other object (from Worksheet 1F)	0.000	0.000	0.000
Other single-vehicle collision (from Worksheet 1F)	0.013	0.004	0.017
Collision with pedestrian (from Worksheet 1I)	0.028	0.000	0.028
Collision with bicycle (from Worksheet 1J)	0.015	0.000	0.015
Subtotal	0.084	0.114	0.198
Total	0.682	1.500	2.182

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	2.2	0.18	12.1
Fatal and injury (FI)	0.7	0.18	3.8
Property damage only (PDO)	1.5	0.18	8.3

Worksheet 1A -- General Information and Input Data for Urban and Suburban Roadway Segments			
General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Old Willow Rd. to Wagner
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	3T
Length of segment, L (mi)		--	0.42
AADT (veh/day)		--	31,000
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)		--	12
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	5
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	7
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	1.00	1.00	1.00

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 Equation 12-10	(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(6)*(7)*(8)
	a	b											
Total	-12.40	1.41	0.66	3.722	1.000	3.722	1.00	1.00	3.722				
Fatal and Injury (FI)	-16.45	1.69	0.59	1.174	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.315	1.172	1.00	1.00	1.172				
Property Damage Only (PDO)	-11.95	1.33	0.59	2.552	$(5)_{TOTAL}-(5)_{FI}$ 0.685	2.550	1.00	1.00	2.550				

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	1.172	1.000	2.550	3.722
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.845	0.991	0.842	2.147	3.138
Head-on collision	0.034	0.040	0.020	0.051	0.091
Angle collision	0.069	0.081	0.020	0.051	0.132
Sideswipe, same direction	0.001	0.001	0.078	0.199	0.200
Sideswipe, opposite direction	0.017	0.020	0.020	0.051	0.071
Other multiple-vehicle collision	0.034	0.040	0.020	0.051	0.091

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 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	0.360	1.000	0.360	1.00	1.00	0.360
Fatal and Injury (FI)	-6.37	0.47	1.06	0.093	(4) _{FI} /((4) _{FI} +(4) _{PDO})	0.096	1.00	1.00	0.096
					0.267				
Property Damage Only (PDO)	-6.29	0.56	1.93	0.255	(5) _{TOTAL} -(5) _{FI}	0.264	1.00	1.00	0.264
					0.733				

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	0.096	1.000	0.264	0.360
		(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	0.066	0.963	0.254	0.320
Collision with other object	0.001	0.000	0.001	0.000	0.000
Other single-vehicle collision	0.310	0.030	0.035	0.009	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_i from Table 12-7	Coefficient for traffic adjustment, t from Table 12-7	Initial N_{brdwy}	Overdispersion parameter, k from Table 12-7	
				Equation 12-16 $n_j * N_j * (AADT/15,000)^t$		
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	0	0.053	1.000	0.000		
Minor residential	12	0.010	1.000	0.248		
Other	0	0.016	1.000	0.000		
Total	--	--	--	0.248		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}) from Table 12-7	Adjusted N_{brdwy} (2) _{TOTAL} * (3)	Combined CMFs (6) from Worksheet 1B	Calibration factor, C_r	Predicted N_{brdwy} (4)*(5)*(6)
	(5) _{TOTAL} from Worksheet 1G					
Total	0.248	1.000	0.248	1.00	1.00	0.248
Fatal and injury (FI)	--	0.243	0.060	1.00	1.00	0.060
Property damage only (PDO)	--	0.757	0.188	1.00	1.00	0.188

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr} from Table 12-8	Calibration factor, C_r	Predicted N_{pedr} (5)*(6)*(7)
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			
Total	3.722	0.360	0.248	4.330	0.013	1.00	0.056
Fatal and injury (FI)	--	--	--	--	--	1.00	0.056

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker} from Table 12-9	Calibration factor, C_r	Predicted N_{biker} (5)*(6)*(7)
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			
Total	3.722	0.360	0.248	4.330	0.007	1.00	0.030
Fatal and injury (FI)	--	--	--	--	--	1.00	0.030

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)	0.991	2.147	3.138
Head-on collisions (from Worksheet 1D)	0.040	0.051	0.091
Angle collisions (from Worksheet 1D)	0.081	0.051	0.132
Sideswipe, same direction (from Worksheet 1D)	0.001	0.199	0.200
Sideswipe, opposite direction (from Worksheet 1D)	0.020	0.051	0.071
Driveway-related collisions (from Worksheet 1H)	0.060	0.188	0.248
Other multiple-vehicle collision (from Worksheet 1D)	0.040	0.051	0.091
Subtotal	1.233	2.738	3.970
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 1F)	0.066	0.254	0.320
Collision with other object (from Worksheet 1F)	0.000	0.000	0.000
Other single-vehicle collision (from Worksheet 1F)	0.030	0.009	0.039
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	0.183	0.264	0.446
Total	1.415	3.001	4.416

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	0.42	10.5
Fatal and injury (FI)	1.4	0.42	3.4
Property damage only (PDO)	3.0	0.42	7.1

**Alternative 2
Intersection Analysis
Willow Road/Sunset Ridge Road**

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections		
General Information		Location Information
Analyst	R. Jacox	Roadway
Agency or Company	TranSystems	Intersection
Date Performed	03/10/11	Jurisdiction
		Analysis Year
		Willow Road at Sunset Ridge Road
		IDOT 2040
Input Data	Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)	--	4SG
AAADT _{major} (veh/day)	--	37,000
AAADT _{minor} (veh/day)	--	12,000
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	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 / Permissive
Type of left-turn signal phasing for Leg #2	--	Protected / Permissive
Type of left-turn signal phasing for Leg #3	--	Protected / Permissive
Type of left-turn signal phasing for Leg #4 (if applicable)	--	Protected / Permissive
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		110
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	1
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
<i>CMF 1i</i>	<i>CMF 2i</i>	<i>CMF 3i</i>	<i>CMF 4i</i>	<i>CMF 5i</i>	<i>CMF 6i</i>	<i>CMF_{COMB}</i>
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	0.96	0.92	0.98	1.00	1.00	0.57

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	Calibration Factor, C_i	Predicted N_{bimv}
	from Table 12-10									
	a	b	c							
Total	-10.99	1.07	0.23	0.39	11.306	1.000	11.306	0.57	1.00	6.474
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	3.813	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.349	3.942	0.57	1.00	2.257
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	7.123	$(5)_{TOTAL}-(5)_{FI}$ 0.651	7.364	0.57	1.00	4.216

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/yea)	Predicted $N_{bimv (TOTAL)}$ (crashes/year)
	from Table 12-11	(9) _{FI} from Worksheet 2C	from Table 12-11	(9) _{PDO} from Worksheet	(9) _{PDO} from Worksheet 2C
Total	1.000	2.257	1.000	4.216	6.474
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	$(3)+(5)$
Rear-end collision	0.450	1.016	0.483	2.037	3.052
Head-on collision	0.049	0.111	0.030	0.126	0.237
Angle collision	0.347	0.783	0.244	1.029	1.812
Sideswipe	0.099	0.223	0.032	0.135	0.358
Other multiple-vehicle collision	0.055	0.124	0.211	0.890	1.014

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_{bisv}	Combined	Calibration Factor, C_i	Predicted N_{bisv}
	from Table 12-12									
	a	b	c							
Total	-10.21	0.68	0.27	0.36	0.594	1.000	0.594	0.57	1.00	0.340
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.135	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.229	0.136	0.57	1.00	0.078
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.455	$(5)_{TOTAL}-(5)_{FI}$ 0.771	0.458	0.57	1.00	0.262

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/yea)	Predicted N _{bisv (TOTAL)} (crashes/year)
	from Table 12-13	(9) _{FI} from Worksheet 2E	from Table 12-13	(9) _{PDO} from Worksheet	(9) _{PDO} from Worksheet 2E
Total	1.000	0.078	1.000	0.262	0.340
		(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	0.228	0.286
Collision with other object	0.072	0.006	0.070	0.018	0.024
Other single-vehicle collision	0.040	0.003	0.023	0.006	0.009
Single-vehicle noncollision	0.141	0.011	0.034	0.009	0.020

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Calibration factor, C _i	Predicted N _{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	--	--	--	--	1.00	--
Fatal and injury (FI)	--	--	--	--	1.00	--

Worksheet 2H -- Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections				
(1)	(2)	(3)	(4)	(5)
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	W/DW Ped Signals with Countdown Ped Signals	Combined CMF
CMF _{1p}	CMF _{2p}	CMF _{3p}	CMF _{4p}	
from Table 12-28	from Table 12-29	from Table 12-30	cmfclearinghouse.org	
2.78	1.35	1.00	0.75	(1)*(2)*(3)*(4) 2.81

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 r, k	N _{pedbase} from Equation 12-29	Combined CMF (4) from Worksheet 2H	Calibration factor, C _i	Predicted N _{pedi} (4)*(5)*(6)
	from Table 12-14									
	a	b	c	d	e					
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.040	2.81	1.00	0.112
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	0.112

Worksheet 2J -- Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N_{bimv}	Predicted N_{bisv}	Predicted N_{bi}	f_{bikei}	Calibration factor, C_i	Predicted N_{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	6.474	0.340	6.814	0.015	1.00	0.102
Fatal and injury (FI)	--	--	--	--	1.00	0.102

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)	1.016	2.037	3.052
Head-on collisions (from Worksheet 2D)	0.111	0.126	0.237
Angle collisions (from Worksheet 2D)	0.783	1.029	1.812
Sideswipe (from Worksheet 2D)	0.223	0.135	0.358
Other multiple-vehicle collision (from Worksheet 2D)	0.124	0.890	1.014
Subtotal	2.257	4.216	6.474
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	0.228	0.286
Collision with other object (from Worksheet 2F)	0.006	0.018	0.024
Other single-vehicle collision (from Worksheet 2F)	0.003	0.006	0.009
Single-vehicle noncollision (from Worksheet 2F)	0.011	0.009	0.020
Collision with pedestrian (from Worksheet 2G or 2I)	0.112	0.000	0.112
Collision with bicycle (from Worksheet 2J)	0.102	0.000	0.102
Subtotal	0.292	0.262	0.554
Total	2.549	4.479	7.027

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	7.0
Fatal and injury (FI)	2.5
Property damage only (PDO)	4.5

Alternative 2A
Willow Road 2-Lane with Median (2005 Plan)

Safety Performance Calculations

**Alternative 2A
Segment Analysis
Willow Road – Sunset Ridge Road to Wagner Road**

Willow Road - Sunset Ridge Road to Wagner Road
 2040 Predicted Crash Frequency
 Alternative 2A (2-Lane with Median - 2005 Plan)

	Predicted Crash Frequency (Crashes/Year)		
	Fatality-Injury	Property Damage Only	Total
Segment 1, Sunset Ridge to Sta. 672+50	0.6	1.2	1.8
Segment 2, Sta. 672+50 to Sta. 677+00	0.3	0.7	1.0
Segment 3, Sta. 677+00 to Sta. 684+00	0.4	0.9	1.3
Segment 4, Sta. 684+00 to Sta. 689+00	0.3	0.7	1.0
Segment 5, Sta. 689+00 to Wagner	0.5	1.1	1.6
Total Crashes	2.0	4.6	6.6

Totals may not add due to rounding.

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

General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Sunset Ridge (Sta. 665+18.17) to Sta. 372+50
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data	Base Conditions	Site Conditions	
Roadway type (2U, 3T, 4U, 4D, ST)	--	3T	
Length of segment, L (mi)	--	0.14	
AADT (veh/day)	--	31,000	
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)	--	1	
Major industrial / institutional driveways (number)	--	1	
Minor industrial / institutional driveways (number)	--	0	
Major residential driveways (number)	--	0	
Minor residential driveways (number)	--	3	
Other driveways (number)	--	0	
Speed Category	--	Posted Speed Greater than 30 mph	
Roadside fixed object density (fixed objects / mi)	0	14	
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]	30	7	
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	1.02	1.00	1.00	1.00	1.02

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	1.241	1.000	1.241	1.02	1.00	1.262					
Fatal and Injury (FI)	-16.45	1.69	0.59	0.391	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.315	0.391	1.02	1.00	0.398					
Property Damage Only (PDO)	-11.95	1.33	0.59	0.851	$(5)_{TOTAL} - (5)_{FI}$ 0.685	0.850	1.02	1.00	0.865					

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	0.398	1.000	0.865	1.262
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.845	0.336	0.842	0.728	1.064
Head-on collision	0.034	0.014	0.020	0.017	0.031
Angle collision	0.069	0.027	0.020	0.017	0.045
Sideswipe, same direction	0.001	0.000	0.078	0.067	0.068
Sideswipe, opposite direction	0.017	0.007	0.020	0.017	0.024
Other multiple-vehicle collision	0.034	0.014	0.020	0.017	0.031

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}
	a	b	from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)	(6) from Worksheet 1B		(6)*(7)*(8)
Total	-5.74	0.54	1.37	0.120	1.000	0.120	1.02	1.00	0.122
Fatal and Injury (FI)	-6.37	0.47	1.06	0.031	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.267	0.032	1.02	1.00	0.033
Property Damage Only (PDO)	-6.29	0.56	1.93	0.085	(5) _{TOTAL} -(5) _{FI} 0.733	0.088	1.02	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	0.033	1.000	0.089	0.122
		(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	0.022	0.963	0.086	0.108
Collision with other object	0.001	0.000	0.001	0.000	0.000
Other single-vehicle collision	0.310	0.010	0.035	0.003	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_i from Table 12-7	Coefficient for traffic adjustment, t from Table 12-7	Initial N_{brdwy}	Overdispersion parameter, k from Table 12-7	
				Equation 12-16 $n_j * N_j * (AADT/15,000)^t$		
Major commercial	0	0.102	1.000	0.000	--	
Minor commercial	1	0.032	1.000	0.066		
Major industrial/institutional	1	0.110	1.000	0.227		
Minor industrial/institutional	0	0.015	1.000	0.000		
Major residential	0	0.053	1.000	0.000		
Minor residential	3	0.010	1.000	0.062		
Other	0	0.016	1.000	0.000		
Total	--	--	--	0.355		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}) from Table 12-7	Adjusted N_{brdwy} (2) _{TOTAL} * (3)	Combined CMFs (6) from Worksheet 1B	Calibration factor, C_r	Predicted N_{brdwy} (4)*(5)*(6)
	(5) _{TOTAL} from Worksheet 1G					
Total	0.355	1.000	0.355	1.02	1.00	0.362
Fatal and injury (FI)	--	0.243	0.086	1.02	1.00	0.088
Property damage only (PDO)	--	0.757	0.269	1.02	1.00	0.274

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr} from Table 12-8	Calibration factor, C_r	Predicted N_{pedr} (5)*(6)*(7)
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			
Total	1.262	0.122	0.362	1.746	0.013	1.00	0.023
Fatal and injury (FI)	--	--	--	--	--	1.00	0.023

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker} from Table 12-9	Calibration factor, C_r	Predicted N_{biker} (5)*(6)*(7)
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			
Total	1.262	0.122	0.362	1.746	0.007	1.00	0.012
Fatal and injury (FI)	--	--	--	--	--	1.00	0.012

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)	0.336	0.728	1.064
Head-on collisions (from Worksheet 1D)	0.014	0.017	0.031
Angle collisions (from Worksheet 1D)	0.027	0.017	0.045
Sideswipe, same direction (from Worksheet 1D)	0.000	0.067	0.068
Sideswipe, opposite direction (from Worksheet 1D)	0.007	0.017	0.024
Driveway-related collisions (from Worksheet 1H)	0.088	0.274	0.362
Other multiple-vehicle collision (from Worksheet 1D)	0.014	0.017	0.031
Subtotal	0.485	1.139	1.624
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 1F)	0.022	0.086	0.108
Collision with other object (from Worksheet 1F)	0.000	0.000	0.000
Other single-vehicle collision (from Worksheet 1F)	0.010	0.003	0.013
Collision with pedestrian (from Worksheet 1I)	0.023	0.000	0.023
Collision with bicycle (from Worksheet 1J)	0.012	0.000	0.012
Subtotal	0.067	0.089	0.157
Total	0.553	1.228	1.781

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	1.8	0.14	12.7
Fatal and injury (FI)	0.6	0.14	3.9
Property damage only (PDO)	1.2	0.14	8.8

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

General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Sta. 672+50 to Sta. 677+00
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	2U
Length of segment, L (mi)		--	0.09
AADT (veh/day)		--	31,000
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)		--	2
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	1.00	1.00	1.00

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								
	a	b	from Table 12-3	from Equation 12-10	(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(6)*(7)*(8)		
Total	-15.22	1.68	0.84	0.776	1.000	0.776	1.00	1.00	0.776
Fatal and Injury (FI)	-16.22	1.66	0.65	0.232	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.287	0.223	1.00	1.00	0.223
Property Damage Only (PDO)	-15.62	1.69	0.87	0.577	$(5)_{TOTAL} - (5)_{FI}$ 0.713	0.553	1.00	1.00	0.553

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	0.223	1.000	0.553	0.776
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.730	0.163	0.778	0.430	0.593
Head-on collision	0.068	0.015	0.004	0.002	0.017
Angle collision	0.085	0.019	0.079	0.044	0.063
Sideswipe, same direction	0.015	0.003	0.031	0.017	0.020
Sideswipe, opposite direction	0.073	0.016	0.055	0.030	0.047
Other multiple-vehicle collision	0.029	0.006	0.053	0.029	0.036

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 (6) from Worksheet 1B	Calibration Factor, Cr	Predicted N _{brsv}
	from Table 12-5								
	a	b							
Total	-5.47	0.56	0.81	0.124	1.000	0.124	1.00	1.00	0.124
Fatal and Injury (FI)	-3.96	0.23	0.50	0.019	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.156	0.019	1.00	1.00	0.019
Property Damage Only (PDO)	-6.51	0.64	0.87	0.100	(5) _{TOTAL} -(5) _{FI} 0.844	0.105	1.00	1.00	0.105

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	0.019	1.000	0.105	0.124
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.026	0.001	0.066	0.007	0.007
Collision with fixed object	0.723	0.014	0.759	0.080	0.094
Collision with other object	0.010	0.000	0.013	0.001	0.002
Other single-vehicle collision	0.241	0.005	0.162	0.017	0.022

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_i from Table 12-7	Coefficient for traffic adjustment, t from Table 12-7	Initial N_{brdwy}	Overdispersion parameter, k from Table 12-7
				Equation 12-16 $n_i * N_j * (AADT/15,000)^t$	
Major commercial	0	0.158	1.000	0.000	--
Minor commercial	0	0.050	1.000	0.000	
Major industrial/institutional	0	0.172	1.000	0.000	
Minor industrial/institutional	0	0.023	1.000	0.000	
Major residential	0	0.083	1.000	0.000	
Minor residential	2	0.016	1.000	0.066	
Other	0	0.025	1.000	0.000	
Total	--	--	--	0.066	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}) from Table 12-7	Adjusted N_{brdwy} (2) _{TOTAL} * (3)	Combined CMFs (6) from Worksheet 1B	Calibration factor, C_r	Predicted N_{brdwy}
	(5) _{TOTAL} from Worksheet 1G					(4)*(5)*(6)
Total	0.066	1.000	0.066	1.00	1.00	0.066
Fatal and injury (FI)	--	0.323	0.021	1.00	1.00	0.021
Property damage only (PDO)	--	0.677	0.045	1.00	1.00	0.045

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr} from Table 12-8	Calibration factor, C_r	Predicted N_{pedr}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			(5)*(6)*(7)
Total	0.776	0.124	0.066	0.966	0.005	1.00	0.005
Fatal and injury (FI)	--	--	--	--	--	1.00	0.005

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker} from Table 12-9	Calibration factor, C_r	Predicted N_{biker}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			(5)*(6)*(7)
Total	0.776	0.124	0.066	0.966	0.004	1.00	0.004
Fatal and injury (FI)	--	--	--	--	--	1.00	0.004

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)	0.163	0.430	0.593
Head-on collisions (from Worksheet 1D)	0.015	0.002	0.017
Angle collisions (from Worksheet 1D)	0.019	0.044	0.063
Sideswipe, same direction (from Worksheet 1D)	0.003	0.017	0.020
Sideswipe, opposite direction (from Worksheet 1D)	0.016	0.030	0.047
Driveway-related collisions (from Worksheet 1H)	0.021	0.045	0.066
Other multiple-vehicle collision (from Worksheet 1D)	0.006	0.029	0.036
Subtotal	0.244	0.598	0.842
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.001	0.007	0.007
Collision with fixed object (from Worksheet 1F)	0.014	0.080	0.094
Collision with other object (from Worksheet 1F)	0.000	0.001	0.002
Other single-vehicle collision (from Worksheet 1F)	0.005	0.017	0.022
Collision with pedestrian (from Worksheet 1I)	0.005	0.000	0.005
Collision with bicycle (from Worksheet 1J)	0.004	0.000	0.004
Subtotal	0.028	0.105	0.133
Total	0.272	0.703	0.975

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Crash Severity Level	Predicted average crash frequency, $N_{\text{predicted}}$ (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)
	(Total) from Worksheet 1K		(2) / (3)
Total	1.0	0.09	10.8
Fatal and injury (FI)	0.3	0.09	3.0
Property damage only (PDO)	0.7	0.09	7.8

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

General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Sta. 677+00 to Sta. 684+00
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	3T
Length of segment, L (mi)		--	0.13
AADT (veh/day)		--	31,000
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)		--	2
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	1.00	1.00	1.00

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								
	a	b	from Table 12-3	from Equation 12-10	(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(6)*(7)*(8)		
Total	-12.40	1.41	0.66	1.152	1.000	1.152	1.00	1.00	1.152
Fatal and Injury (FI)	-16.45	1.69	0.59	0.363	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.315	0.363	1.00	1.00	0.363
Property Damage Only (PDO)	-11.95	1.33	0.59	0.790	$(5)_{TOTAL} - (5)_{FI}$ 0.685	0.789	1.00	1.00	0.789

Worksheet 1D -- Multiple-Vehicle Nondrivable 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		0.363	1.000	0.789	1.152
			(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.845		0.307	0.842	0.665	0.971
Head-on collision	0.034		0.012	0.020	0.016	0.028
Angle collision	0.069		0.025	0.020	0.016	0.041
Sideswipe, same direction	0.001		0.000	0.078	0.062	0.062
Sideswipe, opposite direction	0.017		0.006	0.020	0.016	0.022
Other multiple-vehicle collision	0.034		0.012	0.020	0.016	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 (6) from Worksheet 1B	Calibration Factor, Cr	Predicted N _{brsv}
	from Table 12-5		from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)			(6)*(7)*(8)
	a	b							
Total	-5.74	0.54	1.37	0.111	1.000	0.111	1.00	1.00	0.111
Fatal and Injury (FI)	-6.37	0.47	1.06	0.029	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.267	0.030	1.00	1.00	0.030
Property Damage Only (PDO)	-6.29	0.56	1.93	0.079	(5) _{TOTAL} -(5) _{FI} 0.733	0.082	1.00	1.00	0.082

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	0.030	1.000	0.082	0.111
		(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	0.020	0.963	0.079	0.099
Collision with other object	0.001	0.000	0.001	0.000	0.000
Other single-vehicle collision	0.310	0.009	0.035	0.003	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_i	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	0	0.053	1.000	0.000	
Minor residential	2	0.010	1.000	0.041	
Other	0	0.016	1.000	0.000	
Total	--	--	--	0.041	

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	0.041	1.000	0.041	1.00	1.00	0.041
Fatal and injury (FI)	--	0.243	0.010	1.00	1.00	0.010
Property damage only (PDO)	--	0.757	0.031	1.00	1.00	0.031

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr}	Calibration factor, C_r	Predicted N_{pedr}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	1.152	0.111	0.041	1.305	0.013	1.00	0.017
Fatal and injury (FI)	--	--	--	--	--	1.00	0.017

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker}	Calibration factor, C_r	Predicted N_{biker}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	1.152	0.111	0.041	1.305	0.007	1.00	0.009
Fatal and injury (FI)	--	--	--	--	--	1.00	0.009

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)	0.307	0.665	0.971
Head-on collisions (from Worksheet 1D)	0.012	0.016	0.028
Angle collisions (from Worksheet 1D)	0.025	0.016	0.041
Sideswipe, same direction (from Worksheet 1D)	0.000	0.062	0.062
Sideswipe, opposite direction (from Worksheet 1D)	0.006	0.016	0.022
Driveway-related collisions (from Worksheet 1H)	0.010	0.031	0.041
Other multiple-vehicle collision (from Worksheet 1D)	0.012	0.016	0.028
Subtotal	0.373	0.821	1.193
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 1F)	0.020	0.079	0.099
Collision with other object (from Worksheet 1F)	0.000	0.000	0.000
Other single-vehicle collision (from Worksheet 1F)	0.009	0.003	0.012
Collision with pedestrian (from Worksheet 1I)	0.017	0.000	0.017
Collision with bicycle (from Worksheet 1J)	0.009	0.000	0.009
Subtotal	0.056	0.082	0.137
Total	0.429	0.902	1.331

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Crash Severity Level	Predicted average crash frequency, $N_{\text{predicted}}$ (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)
	(Total) from Worksheet 1K		(2) / (3)
Total	1.3	0.13	10.2
Fatal and injury (FI)	0.4	0.13	3.3
Property damage only (PDO)	0.9	0.13	6.9

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

General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Sta. 684+00 to Sta. 689+00
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	2U
Length of segment, L (mi)		--	0.09
AADT (veh/day)		--	31,000
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)		--	3
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	1.00	1.00	1.00

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}
	a	b							
Total	-15.22	1.68	0.84	0.776	1.000	0.776	1.00	1.00	0.776
Fatal and Injury (FI)	-16.22	1.66	0.65	0.232	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.287	0.223	1.00	1.00	0.223
Property Damage Only (PDO)	-15.62	1.69	0.87	0.577	$(5)_{TOTAL} - (5)_{FI}$ 0.713	0.553	1.00	1.00	0.553

Worksheet 1D -- Multiple-Vehicle Nondrivable 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	0.223	1.000	0.553	0.776
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.730	0.163	0.778	0.430	0.593
Head-on collision	0.068	0.015	0.004	0.002	0.017
Angle collision	0.085	0.019	0.079	0.044	0.063
Sideswipe, same direction	0.015	0.003	0.031	0.017	0.020
Sideswipe, opposite direction	0.073	0.016	0.055	0.030	0.047
Other multiple-vehicle collision	0.029	0.006	0.053	0.029	0.036

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 (6) from Worksheet 1B	Calibration Factor, Cr	Predicted N _{brsv}
	from Table 12-5								
	a	b							
Total	-5.47	0.56	0.81	0.124	1.000	0.124	1.00	1.00	0.124
Fatal and Injury (FI)	-3.96	0.23	0.50	0.019	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.156	0.019	1.00	1.00	0.019
Property Damage Only (PDO)	-6.51	0.64	0.87	0.100	(5) _{TOTAL} -(5) _{FI} 0.844	0.105	1.00	1.00	0.105

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	0.019	1.000	0.105	0.124
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.026	0.001	0.066	0.007	0.007
Collision with fixed object	0.723	0.014	0.759	0.080	0.094
Collision with other object	0.010	0.000	0.013	0.001	0.002
Other single-vehicle collision	0.241	0.005	0.162	0.017	0.022

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_i	Coefficient for traffic adjustment, t	Initial N_{brdwy}	Overdispersion parameter, k
		from Table 12-7	from Table 12-7	Equation 12-16 $n_i * N_i * (AADT/15,000)^t$	from Table 12-7
Major commercial	0	0.158	1.000	0.000	--
Minor commercial	0	0.050	1.000	0.000	
Major industrial/institutional	0	0.172	1.000	0.000	
Minor industrial/institutional	0	0.023	1.000	0.000	
Major residential	0	0.083	1.000	0.000	
Minor residential	3	0.016	1.000	0.099	
Other	0	0.025	1.000	0.000	
Total	--	--	--	0.099	

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	0.099	1.000	0.099	1.00	1.00	0.099
Fatal and injury (FI)	--	0.323	0.032	1.00	1.00	0.032
Property damage only (PDO)	--	0.677	0.067	1.00	1.00	0.067

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr}	Calibration factor, C_r	Predicted N_{pedr}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	0.776	0.124	0.099	0.999	0.005	1.00	0.005
Fatal and injury (FI)	--	--	--	--	--	1.00	0.005

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker}	Calibration factor, C_r	Predicted N_{biker}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	0.776	0.124	0.099	0.999	0.004	1.00	0.004
Fatal and injury (FI)	--	--	--	--	--	1.00	0.004

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)	0.163	0.430	0.593
Head-on collisions (from Worksheet 1D)	0.015	0.002	0.017
Angle collisions (from Worksheet 1D)	0.019	0.044	0.063
Sideswipe, same direction (from Worksheet 1D)	0.003	0.017	0.020
Sideswipe, opposite direction (from Worksheet 1D)	0.016	0.030	0.047
Driveway-related collisions (from Worksheet 1H)	0.032	0.067	0.099
Other multiple-vehicle collision (from Worksheet 1D)	0.006	0.029	0.036
Subtotal	0.255	0.620	0.875
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.001	0.007	0.007
Collision with fixed object (from Worksheet 1F)	0.014	0.080	0.094
Collision with other object (from Worksheet 1F)	0.000	0.001	0.002
Other single-vehicle collision (from Worksheet 1F)	0.005	0.017	0.022
Collision with pedestrian (from Worksheet 1I)	0.005	0.000	0.005
Collision with bicycle (from Worksheet 1J)	0.004	0.000	0.004
Subtotal	0.028	0.105	0.133
Total	0.283	0.725	1.008

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Crash Severity Level	Predicted average crash frequency, $N_{\text{predicted}}$ (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)
	(Total) from Worksheet 1K		(2) / (3)
Total	1.0	0.09	11.2
Fatal and injury (FI)	0.3	0.09	3.1
Property damage only (PDO)	0.7	0.09	8.1

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

General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Sta. 689+00 to Wagner (Sta. 696+69.68)
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	3T
Length of segment, L (mi)		--	0.15
AADT (veh/day)		--	31,000
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)		--	2
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	13
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	7
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	1.01	1.00	1.00	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								
	a	b	from Table 12-3	from Equation 12-10		(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(6)*(7)*(8)	
Total	-12.40	1.41	0.66	1.329	1.000	1.329	1.01	1.00	1.348
Fatal and Injury (FI)	-16.45	1.69	0.59	0.419	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.315	0.419	1.01	1.00	0.424
Property Damage Only (PDO)	-11.95	1.33	0.59	0.912	$(5)_{TOTAL} - (5)_{FI}$ 0.685	0.911	1.01	1.00	0.923

Worksheet 1D -- Multiple-Vehicle Nondrivable 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		0.424	1.000	0.923	1.348
			(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.845		0.359	0.842	0.777	1.136
Head-on collision	0.034		0.014	0.020	0.018	0.033
Angle collision	0.069		0.029	0.020	0.018	0.048
Sideswipe, same direction	0.001		0.000	0.078	0.072	0.072
Sideswipe, opposite direction	0.017		0.007	0.020	0.018	0.026
Other multiple-vehicle collision	0.034		0.014	0.020	0.018	0.033

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 (6) from Worksheet 1B	Calibration Factor, Cr	Predicted N _{brsv}
	from Table 12-5		from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)			(6)*(7)*(8)
	a	b							
Total	-5.74	0.54	1.37	0.128	1.000	0.128	1.01	1.00	0.130
Fatal and Injury (FI)	-6.37	0.47	1.06	0.033	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.267	0.034	1.01	1.00	0.035
Property Damage Only (PDO)	-6.29	0.56	1.93	0.091	(5) _{TOTAL} -(5) _{FI} 0.733	0.094	1.01	1.00	0.095

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	0.035	1.000	0.095	0.130
		(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	0.024	0.963	0.092	0.116
Collision with other object	0.001	0.000	0.001	0.000	0.000
Other single-vehicle collision	0.310	0.011	0.035	0.003	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_i from Table 12-7	Coefficient for traffic adjustment, t from Table 12-7	Initial N_{brdwy}	Overdispersion parameter, k from Table 12-7
				Equation 12-16 $n_j * N_i * (AADT/15,000)^t$	
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	0	0.053	1.000	0.000	
Minor residential	2	0.010	1.000	0.041	
Other	0	0.016	1.000	0.000	
Total	--	--	--	0.041	

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}) from Table 12-7	Adjusted N_{brdwy} (2) _{TOTAL} * (3)	Combined CMFs (6) from Worksheet 1B	Calibration factor, C_r	Predicted N_{brdwy}
	(5) _{TOTAL} from Worksheet 1G					(4)*(5)*(6)
Total	0.041	1.000	0.041	1.01	1.00	0.042
Fatal and injury (FI)	--	0.243	0.010	1.01	1.00	0.010
Property damage only (PDO)	--	0.757	0.031	1.01	1.00	0.032

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr} from Table 12-8	Calibration factor, C_r	Predicted N_{pedr}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			(5)*(6)*(7)
Total	1.348	0.130	0.042	1.520	0.013	1.00	0.020
Fatal and injury (FI)	--	--	--	--	--	1.00	0.020

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker} from Table 12-9	Calibration factor, C_r	Predicted N_{biker}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			(5)*(6)*(7)
Total	1.348	0.130	0.042	1.520	0.007	1.00	0.011
Fatal and injury (FI)	--	--	--	--	--	1.00	0.011

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 1D and 1F; (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)	0.359	0.777	1.136
Head-on collisions (from Worksheet 1D)	0.014	0.018	0.033
Angle collisions (from Worksheet 1D)	0.029	0.018	0.048
Sideswipe, same direction (from Worksheet 1D)	0.000	0.072	0.072
Sideswipe, opposite direction (from Worksheet 1D)	0.007	0.018	0.026
Driveway-related collisions (from Worksheet 1H)	0.010	0.032	0.042
Other multiple-vehicle collision (from Worksheet 1D)	0.014	0.018	0.033
Subtotal	0.435	0.955	1.390
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 1F)	0.024	0.092	0.116
Collision with other object (from Worksheet 1F)	0.000	0.000	0.000
Other single-vehicle collision (from Worksheet 1F)	0.011	0.003	0.014
Collision with pedestrian (from Worksheet 1I)	0.020	0.000	0.020
Collision with bicycle (from Worksheet 1J)	0.011	0.000	0.011
Subtotal	0.065	0.095	0.161
Total	0.500	1.050	1.550

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)
Crash Severity Level	Predicted average crash frequency, $N_{\text{predicted}}$ (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)
	(Total) from Worksheet 1K		(2) / (3)
Total	1.6	0.15	10.3
Fatal and injury (FI)	0.5	0.15	3.3
Property damage only (PDO)	1.1	0.15	7.0

**Alternative 2A
Intersection Analysis
Willow Road/Sunset Ridge Road**

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections		
General Information		Location Information
Analyst	R. Jacox	Roadway
Agency or Company	TranSystems	Intersection
Date Performed	03/10/11	Jurisdiction
		Analysis Year
		Willow Road at Sunset Ridge Road
		IDOT 2040
Input Data	Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)	--	4SG
AADT _{major} (veh/day)	--	37,000
AADT _{minor} (veh/day)	--	12,000
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	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 / Permissive
Type of left-turn signal phasing for Leg #2	--	Protected / Permissive
Type of left-turn signal phasing for Leg #3	--	Protected / Permissive
Type of left-turn signal phasing for Leg #4 (if applicable)	--	Protected / Permissive
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		110
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	1
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
<i>CMF 1i</i>	<i>CMF 2i</i>	<i>CMF 3i</i>	<i>CMF 4i</i>	<i>CMF 5i</i>	<i>CMF 6i</i>	<i>CMF_{COMB}</i>
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	0.96	0.92	0.98	1.00	1.00	0.57

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	Calibration Factor, C_i	Predicted N_{bimv}
	from Table 12-10									
	a	b	c							
Total	-10.99	1.07	0.23	0.39	11.306	1.000	11.306	0.57	1.00	6.474
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	3.813	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.349	3.942	0.57	1.00	2.257
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	7.123	$(5)_{TOTAL}-(5)_{FI}$ 0.651	7.364	0.57	1.00	4.216

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/yea)	Predicted $N_{bimv (TOTAL)}$ (crashes/year)
	from Table 12-11	(9) _{FI} from Worksheet 2C	from Table 12-11	(9) _{PDO} from Worksheet	(9) _{PDO} from Worksheet 2C
Total	1.000	2.257	1.000	4.216	6.474
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	$(3)+(5)$
Rear-end collision	0.450	1.016	0.483	2.037	3.052
Head-on collision	0.049	0.111	0.030	0.126	0.237
Angle collision	0.347	0.783	0.244	1.029	1.812
Sideswipe	0.099	0.223	0.032	0.135	0.358
Other multiple-vehicle collision	0.055	0.124	0.211	0.890	1.014

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_{bisv}	Combined	Calibration Factor, C_i	Predicted N_{bisv}
	from Table 12-12									
	a	b	c							
Total	-10.21	0.68	0.27	0.36	0.594	1.000	0.594	0.57	1.00	0.340
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.135	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.229	0.136	0.57	1.00	0.078
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.455	$(5)_{TOTAL}-(5)_{FI}$ 0.771	0.458	0.57	1.00	0.262

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/yea)	Predicted N _{bisv (TOTAL)} (crashes/year)
	from Table 12-13	(9) _{FI} from Worksheet 2E	from Table 12-13	(9) _{PDO} from Worksheet	(9) _{PDO} from Worksheet 2E
Total	1.000	0.078	1.000	0.262	0.340
		(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	0.228	0.286
Collision with other object	0.072	0.006	0.070	0.018	0.024
Other single-vehicle collision	0.040	0.003	0.023	0.006	0.009
Single-vehicle noncollision	0.141	0.011	0.034	0.009	0.020

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Calibration factor, C _i	Predicted N _{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	--	--	--	--	1.00	--
Fatal and injury (FI)	--	--	--	--	1.00	--

Worksheet 2H -- Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections				
(1)	(2)	(3)	(4)	(5)
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	W/DW Ped Signals with Countdown Ped Signals	Combined CMF
CMF _{1p}	CMF _{2p}	CMF _{3p}	CMF _{4p}	
from Table 12-28	from Table 12-29	from Table 12-30	cmfclearinghouse.org	
2.78	1.35	1.00	0.75	(1)*(2)*(3)*(4) 2.81

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 r, k	N _{pedbase} from Equation 12-29	Combined CMF (4) from Worksheet 2H	Calibration factor, C _i	Predicted N _{pedi}
	from Table 12-14									(4)*(5)*(6)
	a	b	c	d	e					
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.040	2.81	1.00	0.112
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	0.112

Worksheet 2J -- Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N_{bimv}	Predicted N_{bisv}	Predicted N_{bi}	f_{bikei}	Calibration factor, C_i	Predicted N_{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	6.474	0.340	6.814	0.015	1.00	0.102
Fatal and injury (FI)	--	--	--	--	1.00	0.102

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)	1.016	2.037	3.052
Head-on collisions (from Worksheet 2D)	0.111	0.126	0.237
Angle collisions (from Worksheet 2D)	0.783	1.029	1.812
Sideswipe (from Worksheet 2D)	0.223	0.135	0.358
Other multiple-vehicle collision (from Worksheet 2D)	0.124	0.890	1.014
Subtotal	2.257	4.216	6.474
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	0.228	0.286
Collision with other object (from Worksheet 2F)	0.006	0.018	0.024
Other single-vehicle collision (from Worksheet 2F)	0.003	0.006	0.009
Single-vehicle noncollision (from Worksheet 2F)	0.011	0.009	0.020
Collision with pedestrian (from Worksheet 2G or 2I)	0.112	0.000	0.112
Collision with bicycle (from Worksheet 2J)	0.102	0.000	0.102
Subtotal	0.292	0.262	0.554
Total	2.549	4.479	7.027

Worksheet 2L -- Summary Results for Urban and Suburban Arterial Intersections	
(1)	(2)
Crash severity level	Predicted average crash frequency, $N_{predicted}$ <i>int</i> (crashes/year)
	(Total) from Worksheet 2K
Total	7.0
Fatal and injury (FI)	2.5
Property damage only (PDO)	4.5

Alternative 3
Willow Road 4-Lane with Median
Safety Performance Calculations

**Alternative 3
4-Lane with Curbed Median
Segment Analysis
Willow Road – Sunset Ridge Road to Wagner Road**

Willow Road - Sunset Ridge Road to Wagner Road
2040 Predicted Crash Frequency
Alternative 3 (4-Lane with Curbed Median)

	Predicted Crash Frequency (Crashes/Year)		
	Fatality-Injury	Property Damage Only	Total
Segment 1, Sunset Ridge to Old Willow	0.5	1.4	1.9
Segment 2, Old Willow to Wagner	1.2	3.0	4.2
Total Crashes	1.7	4.4	6.1

Totals may not add due to rounding.

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

General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Sunset Ridge to Old Willow Rd
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data	Base Conditions	Site Conditions	
Roadway type (2U, 3T, 4U, 4D, ST)	--	4D	
Length of segment, L (mi)	--	0.18	
AADT (veh/day)	--	42,000	
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)	--	1	
Major industrial / institutional driveways (number)	--	1	
Minor industrial / institutional driveways (number)	--	0	
Major residential driveways (number)	--	0	
Minor residential driveways (number)	--	4	
Other driveways (number)	--	0	
Speed Category	--	Posted Speed Greater than 30 mph	
Roadside fixed object density (fixed objects / mi)	0	11	
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]	30	7	
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	1.01	1.01	1.00	1.00	1.02

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 Equation 12-10	(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(6)*(7)*(8)
	a	b											
Total	-12.34	1.36	1.32	1.527	1.000	1.527	1.02	1.00	1.552				
Fatal and Injury (FI)	-12.76	1.28	1.31	0.428	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.266	0.406	1.02	1.00	0.413				
Property Damage Only (PDO)	-12.81	1.38	1.34	1.180	$(5)_{TOTAL} - (5)_{FI}$ 0.734	1.120	1.02	1.00	1.139				

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	0.413	1.000	1.139	1.552
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.832	0.344	0.662	0.754	1.098
Head-on collision	0.020	0.008	0.007	0.008	0.016
Angle collision	0.040	0.017	0.036	0.041	0.058
Sideswipe, same direction	0.050	0.021	0.223	0.254	0.275
Sideswipe, opposite direction	0.010	0.004	0.001	0.001	0.005
Other multiple-vehicle collision	0.048	0.020	0.071	0.081	0.101

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 a	b	from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)	(6) from Worksheet 1B		(6)*(7)*(8)
Total	-5.05	0.47	0.86	0.172	1.000	0.172	1.02	1.00	0.175
Fatal and Injury (FI)	-8.71	0.66	0.28	0.033	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.192	0.033	1.02	1.00	0.034
Property Damage Only (PDO)	-5.04	0.45	1.06	0.140	(5) _{TOTAL} -(5) _{FI} 0.808	0.139	1.02	1.00	0.141

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	0.034	1.000	0.141	0.175
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.001	0.000	0.063	0.009	0.009
Collision with fixed object	0.500	0.017	0.813	0.115	0.131
Collision with other object	0.028	0.001	0.016	0.002	0.003
Other single-vehicle collision	0.471	0.016	0.108	0.015	0.031

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_i from Table 12-7	Coefficient for traffic adjustment, t from Table 12-7	Initial N_{brdwy}	Overdispersion parameter, k from Table 12-7	
				Equation 12-16 $n_j * N_j * (AADT/15,000)^t$		
Major commercial	0	0.033	1.106	0.000	--	
Minor commercial	1	0.011	1.106	0.034		
Major industrial/institutional	1	0.036	1.106	0.112		
Minor industrial/institutional	0	0.005	1.106	0.000		
Major residential	0	0.018	1.106	0.000		
Minor residential	4	0.003	1.106	0.037		
Other	0	0.005	1.106	0.000		
Total	--	--	--	0.184		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}) from Table 12-7	Adjusted N_{brdwy} (2) _{TOTAL} * (3)	Combined CMFs (6) from Worksheet 1B	Calibration factor, C_r	Predicted N_{brdwy} (4)*(5)*(6)
	(5) _{TOTAL} from Worksheet 1G					
Total	0.184	1.000	0.184	1.02	1.00	0.187
Fatal and injury (FI)	--	0.284	0.052	1.02	1.00	0.053
Property damage only (PDO)	--	0.716	0.132	1.02	1.00	0.134

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr} from Table 12-8	Calibration factor, C_r	Predicted N_{pedr} (5)*(6)*(7)
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			
Total	1.552	0.175	0.187	1.914	0.019	1.00	0.036
Fatal and injury (FI)	--	--	--	--	--	1.00	0.036

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker} from Table 12-9	Calibration factor, C_r	Predicted N_{biker} (5)*(6)*(7)
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			
Total	1.552	0.175	0.187	1.914	0.005	1.00	0.010
Fatal and injury (FI)	--	--	--	--	--	1.00	0.010

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)	0.344	0.754	1.098
Head-on collisions (from Worksheet 1D)	0.008	0.008	0.016
Angle collisions (from Worksheet 1D)	0.017	0.041	0.058
Sideswipe, same direction (from Worksheet 1D)	0.021	0.254	0.275
Sideswipe, opposite direction (from Worksheet 1D)	0.004	0.001	0.005
Driveway-related collisions (from Worksheet 1H)	0.053	0.134	0.187
Other multiple-vehicle collision (from Worksheet 1D)	0.020	0.081	0.101
Subtotal	0.466	1.273	1.740
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.000	0.009	0.009
Collision with fixed object (from Worksheet 1F)	0.017	0.115	0.131
Collision with other object (from Worksheet 1F)	0.001	0.002	0.003
Other single-vehicle collision (from Worksheet 1F)	0.016	0.015	0.031
Collision with pedestrian (from Worksheet 1I)	0.036	0.000	0.036
Collision with bicycle (from Worksheet 1J)	0.010	0.000	0.010
Subtotal	0.080	0.141	0.221
Total	0.546	1.414	1.960

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	0.18	10.9
Fatal and injury (FI)	0.5	0.18	3.0
Property damage only (PDO)	1.4	0.18	7.9

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

General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Old Willow Rd. to Wagner
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data	Base Conditions	Site Conditions	
Roadway type (2U, 3T, 4U, 4D, ST)	--	4D	
Length of segment, L (mi)	--	0.42	
AADT (veh/day)	--	42,000	
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)	--	0	
Major residential driveways (number)	--	0	
Minor residential driveways (number)	--	12	
Other driveways (number)	--	0	
Speed Category	--	Posted Speed Greater than 30 mph	
Roadside fixed object density (fixed objects / mi)	0	5	
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]	30	7	
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	1.00	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 Equation 12-10	(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(6)*(7)*(8)
	a	b											
Total	-12.34	1.36	1.32	3.562	1.000	3.562	1.01	1.00	3.597				
Fatal and Injury (FI)	-12.76	1.28	1.31	0.999	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.266	0.948	1.01	1.00	0.957				
Property Damage Only (PDO)	-12.81	1.38	1.34	2.754	$(5)_{TOTAL} - (5)_{FI}$ 0.734	2.614	1.01	1.00	2.640				

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	0.957	1.000	2.640	3.597
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.832	0.796	0.662	1.748	2.544
Head-on collision	0.020	0.019	0.007	0.018	0.038
Angle collision	0.040	0.038	0.036	0.095	0.133
Sideswipe, same direction	0.050	0.048	0.223	0.589	0.637
Sideswipe, opposite direction	0.010	0.010	0.001	0.003	0.012
Other multiple-vehicle collision	0.048	0.046	0.071	0.187	0.233

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}
	a	b	from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)	(6) from Worksheet 1B		(6)*(7)*(8)
Total	-5.05	0.47	0.86	0.401	1.000	0.401	1.01	1.00	0.405
Fatal and Injury (FI)	-8.71	0.66	0.28	0.078	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.192	0.077	1.01	1.00	0.078
Property Damage Only (PDO)	-5.04	0.45	1.06	0.327	(5) _{TOTAL} -(5) _{FI} 0.808	0.324	1.01	1.00	0.327

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	0.078	1.000	0.327	0.405
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.001	0.000	0.063	0.021	0.021
Collision with fixed object	0.500	0.039	0.813	0.266	0.305
Collision with other object	0.028	0.002	0.016	0.005	0.007
Other single-vehicle collision	0.471	0.037	0.108	0.035	0.072

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_i from Table 12-7	Coefficient for traffic adjustment, t from Table 12-7	Initial N_{brdwy}	Overdispersion parameter, k from Table 12-7	
				Equation 12-16 $n_j * N_j * (AADT/15,000)^t$		
Major commercial	0	0.033	1.106	0.000	--	
Minor commercial	0	0.011	1.106	0.000		
Major industrial/institutional	0	0.036	1.106	0.000		
Minor industrial/institutional	0	0.005	1.106	0.000		
Major residential	0	0.018	1.106	0.000		
Minor residential	12	0.003	1.106	0.112		
Other	0	0.005	1.106	0.000		
Total	--	--	--	0.112		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}) from Table 12-7	Adjusted N_{brdwy} (2) _{TOTAL} * (3)	Combined CMFs (6) from Worksheet 1B	Calibration factor, C_r	Predicted N_{brdwy} (4)*(5)*(6)
	(5) _{TOTAL} from Worksheet 1G					
Total	0.112	1.000	0.112	1.01	1.00	0.114
Fatal and injury (FI)	--	0.284	0.032	1.01	1.00	0.032
Property damage only (PDO)	--	0.716	0.080	1.01	1.00	0.081

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr} from Table 12-8	Calibration factor, C_r	Predicted N_{pedr} (5)*(6)*(7)
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			
Total	3.597	0.405	0.114	4.116	0.019	1.00	0.078
Fatal and injury (FI)	--	--	--	--	--	1.00	0.078

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker} from Table 12-9	Calibration factor, C_r	Predicted N_{biker} (5)*(6)*(7)
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			
Total	3.597	0.405	0.114	4.116	0.005	1.00	0.021
Fatal and injury (FI)	--	--	--	--	--	1.00	0.021

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)	0.796	1.748	2.544
Head-on collisions (from Worksheet 1D)	0.019	0.018	0.038
Angle collisions (from Worksheet 1D)	0.038	0.095	0.133
Sideswipe, same direction (from Worksheet 1D)	0.048	0.589	0.637
Sideswipe, opposite direction (from Worksheet 1D)	0.010	0.003	0.012
Driveway-related collisions (from Worksheet 1H)	0.032	0.081	0.114
Other multiple-vehicle collision (from Worksheet 1D)	0.046	0.187	0.233
Subtotal	0.990	2.722	3.711
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.000	0.021	0.021
Collision with fixed object (from Worksheet 1F)	0.039	0.266	0.305
Collision with other object (from Worksheet 1F)	0.002	0.005	0.007
Other single-vehicle collision (from Worksheet 1F)	0.037	0.035	0.072
Collision with pedestrian (from Worksheet 1I)	0.078	0.000	0.078
Collision with bicycle (from Worksheet 1J)	0.021	0.000	0.021
Subtotal	0.177	0.327	0.504
Total	1.166	3.048	4.215

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	4.2	0.42	10.0
Fatal and injury (FI)	1.2	0.42	2.8
Property damage only (PDO)	3.0	0.42	7.3

**Alternative 3
4-Lane with Curbed Median
Intersection Analysis
Willow Road/Sunset Ridge Road**

Willow Road at Sunset Ridge Road - **Alternative 3 (4-Lane with Curbed Median and Pedestrian Refuge)**
 Urban and Suburban Arterial Predictive Method

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections		
General Information		Location Information
Analyst	R. Jacox	Roadway
Agency or Company	TranSystems	Intersection
Date Performed	03/10/11	Jurisdiction
		Analysis Year
		Willow Road at Sunset Ridge Road
		IDOT
		2040
Input Data	Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)	--	4SG
AAADT _{major} (veh/day)	--	44,000
AAADT _{minor} (veh/day)	--	13,000
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	4
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]	--	4
Type of left-turn signal phasing for Leg #1	Permissive	Protected / Permissive
Type of left-turn signal phasing for Leg #2	--	Protected / Permissive
Type of left-turn signal phasing for Leg #3	--	Protected / Permissive
Type of left-turn signal phasing for Leg #4 (if applicable)	--	Protected / Permissive
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		110
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	1
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
<i>CMF 1i</i>	<i>CMF 2i</i>	<i>CMF 3i</i>	<i>CMF 4i</i>	<i>CMF 5i</i>	<i>CMF 6i</i>	<i>CMF_{COMB}</i>
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	0.96	0.96	0.98	1.00	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	Calibration Factor, C_i	Predicted N_{bimv}
	from Table 12-10									
	a	b	c							
Total	-10.99	1.07	0.23	0.39	13.861	1.000	13.861	0.60	1.00	8.268
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	4.761	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.355	4.916	0.60	1.00	2.932
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	8.664	$(5)_{TOTAL}-(5)_{FI}$ 0.645	8.946	0.60	1.00	5.336

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/yea)	Predicted $N_{bimv (TOTAL)}$ (crashes/year)
	from Table 12-11	$(9)_{FI}$ from Worksheet 2C	from Table 12-11	$(9)_{PDO}$ from Worksheet	$(9)_{PDO}$ from Worksheet 2C
Total	1.000	2.932	1.000	5.336	8.268
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	$(3)+(5)$
Rear-end collision	0.450	1.319	0.483	2.577	3.897
Head-on collision	0.049	0.144	0.030	0.160	0.304
Angle collision	0.347	1.017	0.244	1.302	2.319
Sideswipe	0.099	0.290	0.032	0.171	0.461
Other multiple-vehicle collision	0.055	0.161	0.211	1.126	1.287

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_{bisv}	Combined	Calibration Factor, C_i	Predicted N_{bisv}
	from Table 12-12									
	a	b	c							
Total	-10.21	0.68	0.27	0.36	0.683	1.000	0.683	0.60	1.00	0.407
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.149	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.219	0.149	0.60	1.00	0.089
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.531	$(5)_{TOTAL}-(5)_{FI}$ 0.781	0.533	0.60	1.00	0.318

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/yea)	Predicted N _{bisv (TOTAL)} (crashes/year)
	from Table 12-13	(9) _{FI} from Worksheet 2E	from Table 12-13	(9) _{PDO} from Worksheet	(9) _{PDO} from Worksheet 2E
Total	1.000	0.089	1.000	0.318	0.407
		(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	0.066	0.870	0.277	0.343
Collision with other object	0.072	0.006	0.070	0.022	0.029
Other single-vehicle collision	0.040	0.004	0.023	0.007	0.011
Single-vehicle noncollision	0.141	0.013	0.034	0.011	0.023

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Calibration factor, C _i	Predicted N _{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	--	--	--	--	1.00	--
Fatal and injury (FI)	--	--	--	--	1.00	--

Worksheet 2H -- Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections					
(1)	(2)	(3)	(4)	(5)	(6)
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	CMF for Install Refuge Island	W/DW Ped Signals with Countdown Ped Signals	Combined CMF
CMF _{1p}	CMF _{2p}	CMF _{3p}	CMF _{4p}	CMF _{5p}	
from Table 12-28	from Table 12-29	from Table 12-30	cmfclearinghouse.org	cmfclearinghouse.org	
2.78	1.35	1.00	0.44	0.75	(1)*(2)*(3)*(4)*(5) 1.24

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 r, k	N _{pedbase} from Equation 12-29	Combined CMF (4) from Worksheet 2H	Calibration factor, C _i	Predicted N _{pedi}
	from Table 12-14									(4)*(5)*(6)
	a	b	c	d	e					
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.041	1.24	1.00	0.051
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	0.051

Worksheet 2J -- Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N_{bimv}	Predicted N_{bisv}	Predicted N_{bi}	f_{bikei}	Calibration factor, C_i	Predicted N_{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	8.268	0.407	8.675	0.015	1.00	0.130
Fatal and injury (FI)	--	--	--	--	1.00	0.130

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)	1.319	2.577	3.897
Head-on collisions (from Worksheet 2D)	0.144	0.160	0.304
Angle collisions (from Worksheet 2D)	1.017	1.302	2.319
Sideswipe (from Worksheet 2D)	0.290	0.171	0.461
Other multiple-vehicle collision (from Worksheet 2D)	0.161	1.126	1.287
Subtotal	2.932	5.336	8.268
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	0.277	0.343
Collision with other object (from Worksheet 2F)	0.006	0.022	0.029
Other single-vehicle collision (from Worksheet 2F)	0.004	0.007	0.011
Single-vehicle noncollision (from Worksheet 2F)	0.013	0.011	0.023
Collision with pedestrian (from Worksheet 2G or 2I)	0.051	0.000	0.051
Collision with bicycle (from Worksheet 2J)	0.130	0.000	0.130
Subtotal	0.270	0.318	0.588
Total	3.202	5.654	8.856

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)	3.2
Property damage only (PDO)	5.7

**Alternative 3
4-Lane with Painted Median
Segment Analysis
Willow Road – Sunset Ridge Road to Wagner Road**

Willow Road - Sunset Ridge Road to Wagner Road
2040 Predicted Crash Frequency
Alternative 3 (4-Lane with Painted Median)

	Predicted Crash Frequency (Crashes/Year)		
	Fatality-Injury	Property Damage Only	Total
Segment 1, Sunset Ridge to Old Willow	1.3	3.2	4.4
Segment 2, Old Willow to Wagner	2.4	6.2	8.6
Total Crashes	3.7	9.4	13.0

Totals may not add due to rounding.

Willow Road, Sunset Ridge to Old Willow Road
HSM Urban and Suburban Arterial Predictive Method
Alternative 3 (4-Lane with Painted Median)

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

General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Sunset Ridge to Old Willow Rd
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	5T
Length of segment, L (mi)		--	0.18
AADT (veh/day)		--	42,000
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)		--	1
Major industrial / institutional driveways (number)		--	1
Minor industrial / institutional driveways (number)		--	0
Major residential driveways (number)		--	0
Minor residential driveways (number)		--	4
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	11
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	7
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	1.00	1.00	1.00

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								
	a	b	from Table 12-3	from Equation 12-10	(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(6)*(7)*(8)		
Total	-9.70	1.17	0.81	2.830	1.000	2.830	1.00	1.00	2.839
Fatal and Injury (FI)	-10.47	1.12	0.62	0.770	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.263	0.743	1.00	1.00	0.746
Property Damage Only (PDO)	-9.97	1.17	0.88	2.161	$(5)_{TOTAL} - (5)_{FI}$ 0.737	2.087	1.00	1.00	2.093

Worksheet 1D -- Multiple-Vehicle Nondrivable 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	0.746	1.000	2.093	2.839
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.846	0.631	0.651	1.363	1.993
Head-on collision	0.021	0.016	0.004	0.008	0.024
Angle collision	0.050	0.037	0.059	0.123	0.161
Sideswipe, same direction	0.061	0.045	0.248	0.519	0.565
Sideswipe, opposite direction	0.004	0.003	0.009	0.019	0.022
Other multiple-vehicle collision	0.018	0.013	0.029	0.061	0.074

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 (6) from Worksheet 1B	Calibration Factor, Cr	Predicted N _{brsv}
	from Table 12-5		from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)			(6)*(7)*(8)
	a	b							
Total	-4.82	0.54	0.52	0.456	1.000	0.456	1.00	1.00	0.457
Fatal and Injury (FI)	-4.43	0.35	0.36	0.089	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.203	0.092	1.00	1.00	0.093
Property Damage Only (PDO)	-5.83	0.61	0.55	0.350	(5) _{TOTAL} -(5) _{FI} 0.797	0.363	1.00	1.00	0.364

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	0.093	1.000	0.364	0.457
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.016	0.001	0.049	0.018	0.019
Collision with fixed object	0.398	0.037	0.768	0.280	0.317
Collision with other object	0.005	0.000	0.061	0.022	0.023
Other single-vehicle collision	0.581	0.054	0.122	0.044	0.098

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_i	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	0.165	1.172	0.000	--
Minor commercial	1	0.053	1.172	0.177	
Major industrial/institutional	1	0.181	1.172	0.605	
Minor industrial/institutional	0	0.024	1.172	0.000	
Major residential	0	0.087	1.172	0.000	
Minor residential	4	0.016	1.172	0.214	
Other	0	0.027	1.172	0.000	
Total	--	--	--	0.996	

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	0.996	1.000	0.996	1.00	1.00	0.999
Fatal and injury (FI)	--	0.269	0.268	1.00	1.00	0.269
Property damage only (PDO)	--	0.731	0.728	1.00	1.00	0.730

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr}	Calibration factor, C_r	Predicted N_{pedr}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	2.839	0.457	0.999	4.295	0.023	1.00	0.099
Fatal and injury (FI)	--	--	--	--	--	1.00	0.099

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker}	Calibration factor, C_r	Predicted N_{biker}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	2.839	0.457	0.999	4.295	0.012	1.00	0.052
Fatal and injury (FI)	--	--	--	--	--	1.00	0.052

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)	0.631	1.363	1.993
Head-on collisions (from Worksheet 1D)	0.016	0.008	0.024
Angle collisions (from Worksheet 1D)	0.037	0.123	0.161
Sideswipe, same direction (from Worksheet 1D)	0.045	0.519	0.565
Sideswipe, opposite direction (from Worksheet 1D)	0.003	0.019	0.022
Driveway-related collisions (from Worksheet 1H)	0.269	0.730	0.999
Other multiple-vehicle collision (from Worksheet 1D)	0.013	0.061	0.074
Subtotal	1.014	2.823	3.838
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.001	0.018	0.019
Collision with fixed object (from Worksheet 1F)	0.037	0.280	0.317
Collision with other object (from Worksheet 1F)	0.000	0.022	0.023
Other single-vehicle collision (from Worksheet 1F)	0.054	0.044	0.098
Collision with pedestrian (from Worksheet 1I)	0.099	0.000	0.099
Collision with bicycle (from Worksheet 1J)	0.052	0.000	0.052
Subtotal	0.243	0.364	0.607
Total	1.257	3.188	4.445

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Crash Severity Level	Predicted average crash frequency, $N_{\text{predicted}}$ (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)
	(Total) from Worksheet 1K		(2) / (3)
Total	4.4	0.18	24.7
Fatal and injury (FI)	1.3	0.18	7.0
Property damage only (PDO)	3.2	0.18	17.7

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

General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Old Willow Rd. to Wagner
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data	Base Conditions	Site Conditions	
Roadway type (2U, 3T, 4U, 4D, ST)	--	5T	
Length of segment, L (mi)	--	0.42	
AADT (veh/day)	--	42,000	
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)	--	12	
Other driveways (number)	--	0	
Speed Category	--	Posted Speed Greater than 30 mph	
Roadside fixed object density (fixed objects / mi)	0	5	
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]	30	7	
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	1.00	1.00	1.00

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 Equation 12-10	(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(6)*(7)*(8)
	a	b											
Total	-9.70	1.17	0.81	6.604	1.000	6.604	1.00	1.00	6.604				
Fatal and Injury (FI)	-10.47	1.12	0.62	1.796	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.263	1.734	1.00	1.00	1.734				
Property Damage Only (PDO)	-9.97	1.17	0.88	5.041	$(5)_{TOTAL} - (5)_{FI}$ 0.737	4.869	1.00	1.00	4.869				

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	1.734	1.000	4.869	6.604
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.846	1.467	0.651	3.170	4.637
Head-on collision	0.021	0.036	0.004	0.019	0.056
Angle collision	0.050	0.087	0.059	0.287	0.374
Sideswipe, same direction	0.061	0.106	0.248	1.208	1.313
Sideswipe, opposite direction	0.004	0.007	0.009	0.044	0.051
Other multiple-vehicle collision	0.018	0.031	0.029	0.141	0.172

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	-4.82	0.54	0.52	1.063	1.000	1.063	1.00	1.00	1.063
Fatal and Injury (FI)	-4.43	0.35	0.36	0.208	(4) _{FI} /((4) _{FI} +(4) _{PDO})	0.216	1.00	1.00	0.216
					0.203				
Property Damage Only (PDO)	-5.83	0.61	0.55	0.816	(5) _{TOTAL} -(5) _{FI}	0.847	1.00	1.00	0.847
					0.797				

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	0.216	1.000	0.847	1.063
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.016	0.003	0.049	0.042	0.045
Collision with fixed object	0.398	0.086	0.768	0.651	0.737
Collision with other object	0.005	0.001	0.061	0.052	0.053
Other single-vehicle collision	0.581	0.125	0.122	0.103	0.229

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_i from Table 12-7	Coefficient for traffic adjustment, t from Table 12-7	Initial N_{brdwy}	Overdispersion parameter, k from Table 12-7	
				Equation 12-16 $n_j * N_j * (AADT/15,000)^t$		
Major commercial	0	0.165	1.172	0.000	--	
Minor commercial	0	0.053	1.172	0.000		
Major industrial/institutional	0	0.181	1.172	0.000		
Minor industrial/institutional	0	0.024	1.172	0.000		
Major residential	0	0.087	1.172	0.000		
Minor residential	12	0.016	1.172	0.642		
Other	0	0.027	1.172	0.000		
Total	--	--	--	0.642		0.10

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}) from Table 12-7	Adjusted N_{brdwy} (2) _{TOTAL} * (3)	Combined CMFs (6) from Worksheet 1B	Calibration factor, C_r	Predicted N_{brdwy} (4)*(5)*(6)
	(5) _{TOTAL} from Worksheet 1G					
Total	0.642	1.000	0.642	1.00	1.00	0.642
Fatal and injury (FI)	--	0.269	0.173	1.00	1.00	0.173
Property damage only (PDO)	--	0.731	0.469	1.00	1.00	0.469

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr} from Table 12-8	Calibration factor, C_r	Predicted N_{pedr} (5)*(6)*(7)
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			
Total	6.604	1.063	0.642	8.308	0.023	1.00	0.191
Fatal and injury (FI)	--	--	--	--	--	1.00	0.191

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker} from Table 12-9	Calibration factor, C_r	Predicted N_{biker} (5)*(6)*(7)
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			
Total	6.604	1.063	0.642	8.308	0.012	1.00	0.100
Fatal and injury (FI)	--	--	--	--	--	1.00	0.100

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)	1.467	3.170	4.637
Head-on collisions (from Worksheet 1D)	0.036	0.019	0.056
Angle collisions (from Worksheet 1D)	0.087	0.287	0.374
Sideswipe, same direction (from Worksheet 1D)	0.106	1.208	1.313
Sideswipe, opposite direction (from Worksheet 1D)	0.007	0.044	0.051
Driveway-related collisions (from Worksheet 1H)	0.173	0.469	0.642
Other multiple-vehicle collision (from Worksheet 1D)	0.031	0.141	0.172
Subtotal	1.907	5.338	7.246
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.003	0.042	0.045
Collision with fixed object (from Worksheet 1F)	0.086	0.651	0.737
Collision with other object (from Worksheet 1F)	0.001	0.052	0.053
Other single-vehicle collision (from Worksheet 1F)	0.125	0.103	0.229
Collision with pedestrian (from Worksheet 1I)	0.191	0.000	0.191
Collision with bicycle (from Worksheet 1J)	0.100	0.000	0.100
Subtotal	0.507	0.847	1.354
Total	2.414	6.186	8.599

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	8.6	0.42	20.5
Fatal and injury (FI)	2.4	0.42	5.7
Property damage only (PDO)	6.2	0.42	14.7

**Alternative 3
4-Lane with Painted Median
Intersection Analysis
Willow Road/Sunset Ridge Road**

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections		
General Information		Location Information
Analyst	R. Jacox	Roadway
Agency or Company	TranSystems	Intersection
Date Performed	03/10/11	Jurisdiction
		Analysis Year
		Willow Road at Sunset Ridge Road
		IDOT 2040
Input Data	Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)	--	4SG
AAADT _{major} (veh/day)	--	44,000
AAADT _{minor} (veh/day)	--	13,000
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	4
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]	--	4
Type of left-turn signal phasing for Leg #1	Permissive	Protected / Permissive
Type of left-turn signal phasing for Leg #2	--	Protected / Permissive
Type of left-turn signal phasing for Leg #3	--	Protected / Permissive
Type of left-turn signal phasing for Leg #4 (if applicable)	--	Protected / Permissive
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		110
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	1
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
<i>CMF 1i</i>	<i>CMF 2i</i>	<i>CMF 3i</i>	<i>CMF 4i</i>	<i>CMF 5i</i>	<i>CMF 6i</i>	<i>CMF_{COMB}</i>
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	0.96	0.96	0.98	1.00	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	Calibration Factor, C_i	Predicted N_{bimv}
	from Table 12-10									
	a	b	c							
Total	-10.99	1.07	0.23	0.39	13.861	1.000	13.861	0.60	1.00	8.268
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	4.761	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.355	4.916	0.60	1.00	2.932
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	8.664	$(5)_{TOTAL}-(5)_{FI}$ 0.645	8.946	0.60	1.00	5.336

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/yea)	Predicted $N_{bimv (TOTAL)}$ (crashes/year)
	from Table 12-11	(9) _{FI} from Worksheet 2C	from Table 12-11	(9) _{PDO} from Worksheet	(9) _{PDO} from Worksheet 2C
Total	1.000	2.932	1.000	5.336	8.268
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	$(3)+(5)$
Rear-end collision	0.450	1.319	0.483	2.577	3.897
Head-on collision	0.049	0.144	0.030	0.160	0.304
Angle collision	0.347	1.017	0.244	1.302	2.319
Sideswipe	0.099	0.290	0.032	0.171	0.461
Other multiple-vehicle collision	0.055	0.161	0.211	1.126	1.287

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_{bisv}	Combined	Calibration Factor, C_i	Predicted N_{bisv}
	from Table 12-12									
	a	b	c							
Total	-10.21	0.68	0.27	0.36	0.683	1.000	0.683	0.60	1.00	0.407
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.149	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.219	0.149	0.60	1.00	0.089
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.531	$(5)_{TOTAL}-(5)_{FI}$ 0.781	0.533	0.60	1.00	0.318

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/yea	Predicted N _{bisv (TOTAL)} (crashes/year)
	from Table 12-13	(9) _{FI} from Worksheet 2E	from Table 12-13	(9) _{PDO} from Worksheet	(9) _{PDO} from Worksheet 2E
Total	1.000	0.089	1.000	0.318	0.407
		(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	0.066	0.870	0.277	0.343
Collision with other object	0.072	0.006	0.070	0.022	0.029
Other single-vehicle collision	0.040	0.004	0.023	0.007	0.011
Single-vehicle noncollision	0.141	0.013	0.034	0.011	0.023

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Calibration factor, C _i	Predicted N _{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	--	--	--	--	1.00	--
Fatal and injury (FI)	--	--	--	--	1.00	--

Worksheet 2H -- Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections				
(1)	(2)	(3)	(4)	(5)
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	W/DW Ped Signals with Countdown Ped Signals	Combined CMF
CMF _{1p}	CMF _{2p}	CMF _{3p}	CMF _{4p}	
from Table 12-28	from Table 12-29	from Table 12-30	cmfclearinghouse.org	
2.78	1.35	1.00	0.75	(1)*(2)*(3)*(4) 2.81

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 r, k	N _{pedbase} from Equation 12-29	Combined CMF (4) from Worksheet 2H	Calibration factor, C _i	Predicted N _{pedi}
	from Table 12-14									(4)*(5)*(6)
	a	b	c	d	e					
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.043	2.81	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)	(6)	(7)
Crash Severity Level	Predicted N_{bimv}	Predicted N_{bisv}	Predicted N_{bi}	f_{bikei}	Calibration factor, C_i	Predicted N_{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	8.268	0.407	8.675	0.015	1.00	0.130
Fatal and injury (FI)	--	--	--	--	1.00	0.130

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)	1.319	2.577	3.897
Head-on collisions (from Worksheet 2D)	0.144	0.160	0.304
Angle collisions (from Worksheet 2D)	1.017	1.302	2.319
Sideswipe (from Worksheet 2D)	0.290	0.171	0.461
Other multiple-vehicle collision (from Worksheet 2D)	0.161	1.126	1.287
Subtotal	2.932	5.336	8.268
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	0.277	0.343
Collision with other object (from Worksheet 2F)	0.006	0.022	0.029
Other single-vehicle collision (from Worksheet 2F)	0.004	0.007	0.011
Single-vehicle noncollision (from Worksheet 2F)	0.013	0.011	0.023
Collision with pedestrian (from Worksheet 2G or 2I)	0.120	0.000	0.120
Collision with bicycle (from Worksheet 2J)	0.130	0.000	0.130
Subtotal	0.340	0.318	0.658
Total	3.272	5.654	8.925

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)	3.3
Property damage only (PDO)	5.7

Alternative 4A
Willow Road 3-Lane Unbalanced with Median
(2 Lanes Westbound)

Safety Performance Calculations

**Alternative 4A
Segment Analysis
Willow Road – Sunset Ridge Road to Wagner Road**

Willow Road - Sunset Ridge Road to Wagner Road
 2040 Predicted Crash Frequency
 Alternative 4A (3-Lane Unbalanced with Median - 2 Lanes Westbound)

	Predicted Crash Frequency (Crashes/Year)		
	Fatality-Injury	Property Damage Only	Total
Segment 1, Sunset Ridge to Old Willow (5T)	1.1	2.8	3.9
Segment 1, Sunset Ridge to Old Willow (3T)	0.9	1.9	2.7
Average, Segment 1 Analyses	1.0	2.3	3.3
Segment 2, Old Willow to Wagner (5T)	2.1	5.4	7.5
Segment 2, Old Willow to Wagner (3T)	1.9	3.7	5.6
Average, Segment 2 Analyses	2.0	4.6	6.6
Total Crashes	3.0	6.9	9.9

Totals may not add due to rounding.

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

General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Sunset Ridge to Old Willow Rd
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	5T
Length of segment, L (mi)		--	0.18
AADT (veh/day)		--	37,000
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)		--	1
Major industrial / institutional driveways (number)		--	1
Minor industrial / institutional driveways (number)		--	0
Major residential driveways (number)		--	0
Minor residential driveways (number)		--	4
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	11
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	7
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	1.00	1.00	1.00

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	-9.70	1.17	0.81	2.440	1.000	2.440	1.00	1.00	2.447					
Fatal and Injury (FI)	-10.47	1.12	0.62	0.668	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.264	0.644	1.00	1.00	0.646					
Property Damage Only (PDO)	-9.97	1.17	0.88	1.863	$(5)_{TOTAL} - (5)_{FI}$ 0.736	1.796	1.00	1.00	1.802					

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	0.646	1.000	1.802	2.447
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.846	0.546	0.651	1.173	1.719
Head-on collision	0.021	0.014	0.004	0.007	0.021
Angle collision	0.050	0.032	0.059	0.106	0.139
Sideswipe, same direction	0.061	0.039	0.248	0.447	0.486
Sideswipe, opposite direction	0.004	0.003	0.009	0.016	0.019
Other multiple-vehicle collision	0.018	0.012	0.029	0.052	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 (6) from Worksheet 1B	Calibration Factor, Cr	Predicted N _{brsv}
	from Table 12-5								
	a	b							
Total	-4.82	0.54	0.52	0.425	1.000	0.425	1.00	1.00	0.427
Fatal and Injury (FI)	-4.43	0.35	0.36	0.085	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.208	0.089	1.00	1.00	0.089
Property Damage Only (PDO)	-5.83	0.61	0.55	0.324	(5) _{TOTAL} -(5) _{FI} 0.792	0.337	1.00	1.00	0.338

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	0.089	1.000	0.338	0.427
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.016	0.001	0.049	0.017	0.018
Collision with fixed object	0.398	0.035	0.768	0.259	0.295
Collision with other object	0.005	0.000	0.061	0.021	0.021
Other single-vehicle collision	0.581	0.052	0.122	0.041	0.093

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_i	Coefficient for traffic adjustment, t	Initial N_{brdwy}	Overdispersion parameter, k
		from Table 12-7	from Table 12-7	Equation 12-16 $n_j * N_i * (AADT/15,000)^t$	from Table 12-7
Major commercial	0	0.165	1.172	0.000	--
Minor commercial	1	0.053	1.172	0.153	
Major industrial/institutional	1	0.181	1.172	0.521	
Minor industrial/institutional	0	0.024	1.172	0.000	
Major residential	0	0.087	1.172	0.000	
Minor residential	4	0.016	1.172	0.184	
Other	0	0.027	1.172	0.000	
Total	--	--	--	0.859	

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	0.859	1.000	0.859	1.00	1.00	0.861
Fatal and injury (FI)	--	0.269	0.231	1.00	1.00	0.232
Property damage only (PDO)	--	0.731	0.628	1.00	1.00	0.629

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr}	Calibration factor, C_r	Predicted N_{pedr}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	2.447	0.427	0.861	3.735	0.023	1.00	0.086
Fatal and injury (FI)	--	--	--	--	--	1.00	0.086

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker}	Calibration factor, C_r	Predicted N_{biker}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	2.447	0.427	0.861	3.735	0.012	1.00	0.045
Fatal and injury (FI)	--	--	--	--	--	1.00	0.045

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)	0.546	1.173	1.719
Head-on collisions (from Worksheet 1D)	0.014	0.007	0.021
Angle collisions (from Worksheet 1D)	0.032	0.106	0.139
Sideswipe, same direction (from Worksheet 1D)	0.039	0.447	0.486
Sideswipe, opposite direction (from Worksheet 1D)	0.003	0.016	0.019
Driveway-related collisions (from Worksheet 1H)	0.232	0.629	0.861
Other multiple-vehicle collision (from Worksheet 1D)	0.012	0.052	0.064
Subtotal	0.877	2.431	3.309
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.001	0.017	0.018
Collision with fixed object (from Worksheet 1F)	0.035	0.259	0.295
Collision with other object (from Worksheet 1F)	0.000	0.021	0.021
Other single-vehicle collision (from Worksheet 1F)	0.052	0.041	0.093
Collision with pedestrian (from Worksheet 1I)	0.086	0.000	0.086
Collision with bicycle (from Worksheet 1J)	0.045	0.000	0.045
Subtotal	0.220	0.338	0.557
Total	1.097	2.769	3.866

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Crash Severity Level	Predicted average crash frequency, $N_{\text{predicted rs}}$ (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)
	(Total) from Worksheet 1K		(2) / (3)
Total	3.9	0.18	21.5
Fatal and injury (FI)	1.1	0.18	6.1
Property damage only (PDO)	2.8	0.18	15.4

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

General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Old Willow Rd. to Wagner
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	5T
Length of segment, L (mi)		--	0.42
AADT (veh/day)		--	37,000
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)		--	12
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	5
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	7
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	1.00	1.00	1.00

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								
	a	b	from Table 12-3	from Equation 12-10		(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(6)*(7)*(8)	
Total	-9.70	1.17	0.81	5.694	1.000	5.694	1.00	1.00	5.694
Fatal and Injury (FI)	-10.47	1.12	0.62	1.558	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.264	1.502	1.00	1.00	1.502
Property Damage Only (PDO)	-9.97	1.17	0.88	4.346	$(5)_{TOTAL} - (5)_{FI}$ 0.736	4.191	1.00	1.00	4.191

Worksheet 1D -- Multiple-Vehicle Nondrivable 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	1.502	1.000	4.191	5.694
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.846	1.271	0.651	2.728	4.000
Head-on collision	0.021	0.032	0.004	0.017	0.048
Angle collision	0.050	0.075	0.059	0.247	0.322
Sideswipe, same direction	0.061	0.092	0.248	1.039	1.131
Sideswipe, opposite direction	0.004	0.006	0.009	0.038	0.044
Other multiple-vehicle collision	0.018	0.027	0.029	0.122	0.149

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 (6) from Worksheet 1B	Calibration Factor, Cr	Predicted N _{brsv}
	from Table 12-5		from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)			(6)*(7)*(8)
	a	b							
Total	-4.82	0.54	0.52	0.993	1.000	0.993	1.00	1.00	0.993
Fatal and Injury (FI)	-4.43	0.35	0.36	0.199	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.208	0.207	1.00	1.00	0.207
Property Damage Only (PDO)	-5.83	0.61	0.55	0.755	(5) _{TOTAL} -(5) _{FI} 0.792	0.786	1.00	1.00	0.786

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	0.207	1.000	0.786	0.993
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.016	0.003	0.049	0.039	0.042
Collision with fixed object	0.398	0.082	0.768	0.603	0.686
Collision with other object	0.005	0.001	0.061	0.048	0.049
Other single-vehicle collision	0.581	0.120	0.122	0.096	0.216

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_i from Table 12-7	Coefficient for traffic adjustment, t from Table 12-7	Initial N_{brdwy}	Overdispersion parameter, k from Table 12-7
				Equation 12-16 $n_j * N_i * (AADT/15,000)^t$	
Major commercial	0	0.165	1.172	0.000	--
Minor commercial	0	0.053	1.172	0.000	
Major industrial/institutional	0	0.181	1.172	0.000	
Minor industrial/institutional	0	0.024	1.172	0.000	
Major residential	0	0.087	1.172	0.000	
Minor residential	12	0.016	1.172	0.553	
Other	0	0.027	1.172	0.000	
Total	--	--	--	0.553	

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}) from Table 12-7	Adjusted N_{brdwy} (2) _{TOTAL} * (3)	Combined CMFs (6) from Worksheet 1B	Calibration factor, C_r	Predicted N_{brdwy} (4)*(5)*(6)
	(5) _{TOTAL} from Worksheet 1G					
Total	0.553	1.000	0.553	1.00	1.00	0.553
Fatal and injury (FI)	--	0.269	0.149	1.00	1.00	0.149
Property damage only (PDO)	--	0.731	0.404	1.00	1.00	0.404

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr} from Table 12-8	Calibration factor, C_r	Predicted N_{pedr} (5)*(6)*(7)
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			
Total	5.694	0.993	0.553	7.239	0.023	1.00	0.167
Fatal and injury (FI)	--	--	--	--	--	1.00	0.167

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker} from Table 12-9	Calibration factor, C_r	Predicted N_{biker} (5)*(6)*(7)
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			
Total	5.694	0.993	0.553	7.239	0.012	1.00	0.087
Fatal and injury (FI)	--	--	--	--	--	1.00	0.087

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)	1.271	2.728	4.000
Head-on collisions (from Worksheet 1D)	0.032	0.017	0.048
Angle collisions (from Worksheet 1D)	0.075	0.247	0.322
Sideswipe, same direction (from Worksheet 1D)	0.092	1.039	1.131
Sideswipe, opposite direction (from Worksheet 1D)	0.006	0.038	0.044
Driveway-related collisions (from Worksheet 1H)	0.149	0.404	0.553
Other multiple-vehicle collision (from Worksheet 1D)	0.027	0.122	0.149
Subtotal	1.651	4.596	6.247
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.003	0.039	0.042
Collision with fixed object (from Worksheet 1F)	0.082	0.603	0.686
Collision with other object (from Worksheet 1F)	0.001	0.048	0.049
Other single-vehicle collision (from Worksheet 1F)	0.120	0.096	0.216
Collision with pedestrian (from Worksheet 1I)	0.167	0.000	0.167
Collision with bicycle (from Worksheet 1J)	0.087	0.000	0.087
Subtotal	0.460	0.786	1.246
Total	2.111	5.381	7.493

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Crash Severity Level	Predicted average crash frequency, $N_{\text{predicted rs}}$ (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)
	(Total) from Worksheet 1K		(2) / (3)
Total	7.5	0.42	17.8
Fatal and injury (FI)	2.1	0.42	5.0
Property damage only (PDO)	5.4	0.42	12.8

Worksheet 1A -- General Information and Input Data for Urban and Suburban Roadway Segments			
General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Sunset Ridge to Old Willow Rd
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	3T
Length of segment, L (mi)		--	0.18
AADT (veh/day)		--	37,000
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)		--	1
Major industrial / institutional driveways (number)		--	1
Minor industrial / institutional driveways (number)		--	0
Major residential driveways (number)		--	0
Minor residential driveways (number)		--	4
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	11
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	7
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	1.01	1.00	1.00	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 Equation 12-10	(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(6)*(7)*(8)
	a	b											
Total	-12.40	1.41	0.66	2.047	1.000	2.047	1.01	1.00	2.060				
Fatal and Injury (FI)	-16.45	1.69	0.59	0.678	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.329	0.673	1.01	1.00	0.678				
Property Damage Only (PDO)	-11.95	1.33	0.59	1.384	$(5)_{TOTAL} - (5)_{FI}$ 0.671	1.374	1.01	1.00	1.383				

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	0.678	1.000	1.383	2.060
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.845	0.573	0.842	1.164	1.737
Head-on collision	0.034	0.023	0.020	0.028	0.051
Angle collision	0.069	0.047	0.020	0.028	0.074
Sideswipe, same direction	0.001	0.001	0.078	0.108	0.109
Sideswipe, opposite direction	0.017	0.012	0.020	0.028	0.039
Other multiple-vehicle collision	0.034	0.023	0.020	0.028	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)
	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 Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)	(6) from Worksheet 1B		(6)*(7)*(8)
Total	a	b	1.37	0.170	1.000	0.170	1.01	1.00	0.171
Fatal and Injury (FI)	-5.74	0.54	1.06	0.043	(4) _{FI} /((4) _{FI} +(4) _{PDO})	0.045	1.01	1.00	0.045
	-6.37	0.47			0.264				
Property Damage Only (PDO)	-6.29	0.56	1.93	0.121	(5) _{TOTAL} -(5) _{FI}	0.125	1.01	1.00	0.126
					0.736				

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	0.126	0.171
		(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	0.031	0.963	0.121	0.152
Collision with other object	0.001	0.000	0.001	0.000	0.000
Other single-vehicle collision	0.310	0.014	0.035	0.004	0.018

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_i	Coefficient for traffic adjustment, t	Initial N_{brdwy}	Overdispersion parameter, k	
		from Table 12-7	from Table 12-7	Equation 12-16 $n_j * N_j * (AADT/15,000)^t$		
Major commercial	0	0.102	1.000	0.000	--	
Minor commercial	1	0.032	1.000	0.079		
Major industrial/institutional	1	0.110	1.000	0.271		
Minor industrial/institutional	0	0.015	1.000	0.000		
Major residential	0	0.053	1.000	0.000		
Minor residential	4	0.010	1.000	0.099		
Other	0	0.016	1.000	0.000		
Total	--	--	--	0.449		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	0.449	1.000	0.449	1.01	1.00	0.452
Fatal and injury (FI)	--	0.243	0.109	1.01	1.00	0.110
Property damage only (PDO)	--	0.757	0.340	1.01	1.00	0.342

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr}	Calibration factor, C_r	Predicted N_{pedr}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	2.060	0.171	0.452	2.683	0.013	1.00	0.035
Fatal and injury (FI)	--	--	--	--	--	1.00	0.035

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker}	Calibration factor, C_r	Predicted N_{biker}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	2.060	0.171	0.452	2.683	0.007	1.00	0.019
Fatal and injury (FI)	--	--	--	--	--	1.00	0.019

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)	0.573	1.164	1.737
Head-on collisions (from Worksheet 1D)	0.023	0.028	0.051
Angle collisions (from Worksheet 1D)	0.047	0.028	0.074
Sideswipe, same direction (from Worksheet 1D)	0.001	0.108	0.109
Sideswipe, opposite direction (from Worksheet 1D)	0.012	0.028	0.039
Driveway-related collisions (from Worksheet 1H)	0.110	0.342	0.452
Other multiple-vehicle collision (from Worksheet 1D)	0.023	0.028	0.051
Subtotal	0.787	1.725	2.512
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 1F)	0.031	0.121	0.152
Collision with other object (from Worksheet 1F)	0.000	0.000	0.000
Other single-vehicle collision (from Worksheet 1F)	0.014	0.004	0.018
Collision with pedestrian (from Worksheet 1I)	0.035	0.000	0.035
Collision with bicycle (from Worksheet 1J)	0.019	0.000	0.019
Subtotal	0.099	0.126	0.224
Total	0.886	1.850	2.736

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	2.7	0.18	15.2
Fatal and injury (FI)	0.9	0.18	4.9
Property damage only (PDO)	1.9	0.18	10.3

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

General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Old Willow Rd. to Wagner
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	3T
Length of segment, L (mi)		--	0.42
AADT (veh/day)		--	37,000
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)		--	12
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	5
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	7
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	1.00	1.00	1.00

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								
	a	b	from Table 12-3	from Equation 12-10		(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(6)*(7)*(8)	
Total	-12.40	1.41	0.66	4.777	1.000	4.777	1.00	1.00	4.777
Fatal and Injury (FI)	-16.45	1.69	0.59	1.583	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.329	1.571	1.00	1.00	1.571
Property Damage Only (PDO)	-11.95	1.33	0.59	3.230	$(5)_{TOTAL} - (5)_{FI}$ 0.671	3.206	1.00	1.00	3.206

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	1.571	1.000	3.206	4.777
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.845	1.328	0.842	2.699	4.027
Head-on collision	0.034	0.053	0.020	0.064	0.118
Angle collision	0.069	0.108	0.020	0.064	0.173
Sideswipe, same direction	0.001	0.002	0.078	0.250	0.252
Sideswipe, opposite direction	0.017	0.027	0.020	0.064	0.091
Other multiple-vehicle collision	0.034	0.053	0.020	0.064	0.118

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 (6) from Worksheet 1B	Calibration Factor, Cr	Predicted N _{brsv}
	from Table 12-5								
	a	b	from Table 12-5	from Equation 12-13	(4) _{TOTAL} *(5)	(6)*(7)*(8)			
Total	-5.74	0.54	1.37	0.396	1.000	0.396	1.00	1.00	0.396
Fatal and Injury (FI)	-6.37	0.47	1.06	0.101	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.264	0.104	1.00	1.00	0.104
Property Damage Only (PDO)	-6.29	0.56	1.93	0.282	(5) _{TOTAL} -(5) _{FI} 0.736	0.291	1.00	1.00	0.291

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	0.104	1.000	0.291	0.396
		(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	0.072	0.963	0.280	0.352
Collision with other object	0.001	0.000	0.001	0.000	0.000
Other single-vehicle collision	0.310	0.032	0.035	0.010	0.043

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_i	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	0	0.053	1.000	0.000	
Minor residential	12	0.010	1.000	0.296	
Other	0	0.016	1.000	0.000	
Total	--	--	--	0.296	

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	0.296	1.000	0.296	1.00	1.00	0.296
Fatal and injury (FI)	--	0.243	0.072	1.00	1.00	0.072
Property damage only (PDO)	--	0.757	0.224	1.00	1.00	0.224

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr}	Calibration factor, C_r	Predicted N_{pedr}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	4.777	0.396	0.296	5.469	0.013	1.00	0.071
Fatal and injury (FI)	--	--	--	--	--	1.00	0.071

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker}	Calibration factor, C_r	Predicted N_{biker}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	4.777	0.396	0.296	5.469	0.007	1.00	0.038
Fatal and injury (FI)	--	--	--	--	--	1.00	0.038

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)	1.328	2.699	4.027
Head-on collisions (from Worksheet 1D)	0.053	0.064	0.118
Angle collisions (from Worksheet 1D)	0.108	0.064	0.173
Sideswipe, same direction (from Worksheet 1D)	0.002	0.250	0.252
Sideswipe, opposite direction (from Worksheet 1D)	0.027	0.064	0.091
Driveway-related collisions (from Worksheet 1H)	0.072	0.224	0.296
Other multiple-vehicle collision (from Worksheet 1D)	0.053	0.064	0.118
Subtotal	1.643	3.430	5.073
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 1F)	0.072	0.280	0.352
Collision with other object (from Worksheet 1F)	0.000	0.000	0.000
Other single-vehicle collision (from Worksheet 1F)	0.032	0.010	0.043
Collision with pedestrian (from Worksheet 1I)	0.071	0.000	0.071
Collision with bicycle (from Worksheet 1J)	0.038	0.000	0.038
Subtotal	0.214	0.291	0.505
Total	1.857	3.721	5.578

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Crash Severity Level	Predicted average crash frequency, $N_{\text{predicted rs}}$ (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)
	(Total) from Worksheet 1K		(2) / (3)
Total	5.6	0.42	13.3
Fatal and injury (FI)	1.9	0.42	4.4
Property damage only (PDO)	3.7	0.42	8.9

**Alternative 4A
Intersection Analysis
Willow Road/Sunset Ridge Road**

Willow Road at Sunset Ridge Road - **Alternative 4A (Unbalanced 3-Lane with Median - 2 Lanes Westbound)**
 Urban and Suburban Arterial Predictive Method

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections		
General Information		Location Information
Analyst	R. Jacox	Roadway
Agency or Company	TranSystems	Intersection
Date Performed	03/10/11	Jurisdiction
		Analysis Year
		Willow Road at Sunset Ridge Road
		IDOT 2040
Input Data	Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)	--	4SG
AAADT _{major} (veh/day)	--	39,000
AAADT _{minor} (veh/day)	--	12,000
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	4
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]	--	4
Type of left-turn signal phasing for Leg #1	Permissive	Protected / Permissive
Type of left-turn signal phasing for Leg #2	--	Protected / Permissive
Type of left-turn signal phasing for Leg #3	--	Protected / Permissive
Type of left-turn signal phasing for Leg #4 (if applicable)	--	Protected / Permissive
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		110
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	1
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
<i>CMF 1i</i>	<i>CMF 2i</i>	<i>CMF 3i</i>	<i>CMF 4i</i>	<i>CMF 5i</i>	<i>CMF 6i</i>	<i>CMF_{COMB}</i>
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	0.96	0.96	0.98	1.00	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	Calibration Factor, C_i	Predicted N_{bimv}
	from Table 12-10									
	a	b	c							
Total	-10.99	1.07	0.23	0.39	11.961	1.000	11.961	0.60	1.00	7.134
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	4.057	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.351	4.193	0.60	1.00	2.501
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	7.516	$(5)_{TOTAL}-(5)_{FI}$ 0.649	7.767	0.60	1.00	4.633

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/yea)	Predicted $N_{bimv (TOTAL)}$ (crashes/year)
	from Table 12-11	(9) _{FI} from Worksheet 2C	from Table 12-11	(9) _{PDO} from Worksheet	(9) _{PDO} from Worksheet 2C
Total	1.000	2.501	1.000	4.633	7.134
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	$(3)+(5)$
Rear-end collision	0.450	1.126	0.483	2.238	3.363
Head-on collision	0.049	0.123	0.030	0.139	0.262
Angle collision	0.347	0.868	0.244	1.130	1.998
Sideswipe	0.099	0.248	0.032	0.148	0.396
Other multiple-vehicle collision	0.055	0.138	0.211	0.978	1.115

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_{bisv}	Combined	Calibration Factor, C_i	Predicted N_{bisv}
	from Table 12-12									
	a	b	c							
Total	-10.21	0.68	0.27	0.36	0.615	1.000	0.615	0.60	1.00	0.367
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.138	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.225	0.139	0.60	1.00	0.083
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.474	$(5)_{TOTAL}-(5)_{FI}$ 0.775	0.477	0.60	1.00	0.284

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/yea	Predicted N _{bisv (TOTAL)} (crashes/year)
	from Table 12-13	(9) _{FI} from Worksheet 2E	from Table 12-13	(9) _{PDO} from Worksheet	(9) _{PDO} from Worksheet 2E
Total	1.000	0.083	1.000	0.284	0.367
		(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	0.062	0.870	0.247	0.309
Collision with other object	0.072	0.006	0.070	0.020	0.026
Other single-vehicle collision	0.040	0.003	0.023	0.007	0.010
Single-vehicle noncollision	0.141	0.012	0.034	0.010	0.021

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Calibration factor, C _i	Predicted N _{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	--	--	--	--	1.00	--
Fatal and injury (FI)	--	--	--	--	1.00	--

Worksheet 2H -- Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections				
(1)	(2)	(3)	(4)	(5)
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	W/DW Ped Signals with Countdown Ped Signals	Combined CMF
CMF _{1p}	CMF _{2p}	CMF _{3p}	CMF _{4p}	
from Table 12-28	from Table 12-29	from Table 12-30	cmfclearinghouse.org	
2.78	1.35	1.00	0.75	(1)*(2)*(3)*(4) 2.81

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 r, k	N _{pedbase} from Equation 12-29	Combined CMF (4) from Worksheet 2H	Calibration factor, C _i	Predicted N _{pedi}
	from Table 12-14									(4)*(5)*(6)
	a	b	c	d	e					
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.040	2.81	1.00	0.112
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	0.112

Worksheet 2J -- Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N_{bimv}	Predicted N_{bisv}	Predicted N_{bi}	f_{bikei}	Calibration factor, C_i	Predicted N_{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	7.134	0.367	7.501	0.015	1.00	0.113
Fatal and injury (FI)	--	--	--	--	1.00	0.113

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)	1.126	2.238	3.363
Head-on collisions (from Worksheet 2D)	0.123	0.139	0.262
Angle collisions (from Worksheet 2D)	0.868	1.130	1.998
Sideswipe (from Worksheet 2D)	0.248	0.148	0.396
Other multiple-vehicle collision (from Worksheet 2D)	0.138	0.978	1.115
Subtotal	2.501	4.633	7.134
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)	0.062	0.247	0.309
Collision with other object (from Worksheet 2F)	0.006	0.020	0.026
Other single-vehicle collision (from Worksheet 2F)	0.003	0.007	0.010
Single-vehicle noncollision (from Worksheet 2F)	0.012	0.010	0.021
Collision with pedestrian (from Worksheet 2G or 2I)	0.112	0.000	0.112
Collision with bicycle (from Worksheet 2J)	0.113	0.000	0.113
Subtotal	0.307	0.284	0.591
Total	2.808	4.917	7.725

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	7.7
Fatal and injury (FI)	2.8
Property damage only (PDO)	4.9

Alternative 4B
Willow Road 3-Lane Unbalanced with Median
(2 Lanes Eastbound)

Safety Performance Calculations

**Alternative 4B
Segment Analysis
Willow Road – Sunset Ridge Road to Wagner Road**

Willow Road - Sunset Ridge Road to Wagner Road
 2040 Predicted Crash Frequency
 Alternative 4B (3-Lane Unbalanced with Median - 2 Lanes Eastbound)

	Predicted Crash Frequency (Crashes/Year)		
	Fatality-Injury	Property Damage Only	Total
Segment 1, Sunset Ridge to Old Willow (5T)	1.1	2.7	3.8
Segment 1, Sunset Ridge to Old Willow (3T)	0.9	1.8	2.6
Average, Segment 1 Analyses	1.0	2.2	3.2
Segment 2, Old Willow to Wagner (5T)	2.1	5.2	7.3
Segment 2, Old Willow to Wagner (3T)	1.8	3.6	5.4
Average, Segment 2 Analyses	1.9	4.4	6.4
Total Crashes	2.9	6.7	9.6

Totals may not add due to rounding.

Worksheet 1A -- General Information and Input Data for Urban and Suburban Roadway Segments			
General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Sunset Ridge to Old Willow Rd
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data	Base Conditions	Site Conditions	
Roadway type (2U, 3T, 4U, 4D, ST)	--	5T	
Length of segment, L (mi)	--	0.18	
AADT (veh/day)	--	36,000	
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)	--	1	
Major industrial / institutional driveways (number)	--	1	
Minor industrial / institutional driveways (number)	--	0	
Major residential driveways (number)	--	0	
Minor residential driveways (number)	--	4	
Other driveways (number)	--	0	
Speed Category	--	Posted Speed Greater than 30 mph	
Roadside fixed object density (fixed objects / mi)	0	11	
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]	30	7	
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	1.00	1.00	1.00

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 Equation 12-10	(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(6)*(7)*(8)
	a	b											
Total	-9.70	1.17	0.81	2.363	1.000	2.363	1.00	1.00	2.370				
Fatal and Injury (FI)	-10.47	1.12	0.62	0.648	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.264	0.624	1.00	1.00	0.626				
Property Damage Only (PDO)	-9.97	1.17	0.88	1.804	$(5)_{TOTAL} - (5)_{FI}$ 0.736	1.739	1.00	1.00	1.744				

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	0.626	1.000	1.744	2.370
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.846	0.530	0.651	1.135	1.665
Head-on collision	0.021	0.013	0.004	0.007	0.020
Angle collision	0.050	0.031	0.059	0.103	0.134
Sideswipe, same direction	0.061	0.038	0.248	0.433	0.471
Sideswipe, opposite direction	0.004	0.003	0.009	0.016	0.018
Other multiple-vehicle collision	0.018	0.011	0.029	0.051	0.062

Worksheet 1E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
	SPF Coefficients		Overdispersion 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)
Total	a	b	0.52	0.419	1.000	0.419	1.00	1.00	0.420
Fatal and Injury (FI)	-4.82	0.54	0.36	0.084	(4) _{FI} /((4) _{FI} +(4) _{PDO})	0.088	1.00	1.00	0.088
					0.210				
Property Damage Only (PDO)	-5.83	0.61	0.55	0.318	(5) _{TOTAL} -(5) _{FI}	0.331	1.00	1.00	0.332
					0.790				

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	0.088	1.000	0.332	0.420
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.016	0.001	0.049	0.016	0.018
Collision with fixed object	0.398	0.035	0.768	0.255	0.290
Collision with other object	0.005	0.000	0.061	0.020	0.021
Other single-vehicle collision	0.581	0.051	0.122	0.041	0.092

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_i	Coefficient for traffic adjustment, t	Initial N_{brdwy}	Overdispersion parameter, k	
		from Table 12-7	from Table 12-7	Equation 12-16 $n_j * N_j * (AADT/15,000)^t$		
Major commercial	0	0.165	1.172	0.000	--	
Minor commercial	1	0.053	1.172	0.148		
Major industrial/institutional	1	0.181	1.172	0.505		
Minor industrial/institutional	0	0.024	1.172	0.000		
Major residential	0	0.087	1.172	0.000		
Minor residential	4	0.016	1.172	0.179		
Other	0	0.027	1.172	0.000		
Total	--	--	--	0.831		0.10

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	0.831	1.000	0.831	1.00	1.00	0.834
Fatal and injury (FI)	--	0.269	0.224	1.00	1.00	0.224
Property damage only (PDO)	--	0.731	0.608	1.00	1.00	0.610

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr}	Calibration factor, C_r	Predicted N_{pedr}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	2.370	0.420	0.834	3.625	0.023	1.00	0.083
Fatal and injury (FI)	--	--	--	--	--	1.00	0.083

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker}	Calibration factor, C_r	Predicted N_{biker}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	2.370	0.420	0.834	3.625	0.012	1.00	0.043
Fatal and injury (FI)	--	--	--	--	--	1.00	0.043

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)	0.530	1.135	1.665
Head-on collisions (from Worksheet 1D)	0.013	0.007	0.020
Angle collisions (from Worksheet 1D)	0.031	0.103	0.134
Sideswipe, same direction (from Worksheet 1D)	0.038	0.433	0.471
Sideswipe, opposite direction (from Worksheet 1D)	0.003	0.016	0.018
Driveway-related collisions (from Worksheet 1H)	0.224	0.610	0.834
Other multiple-vehicle collision (from Worksheet 1D)	0.011	0.051	0.062
Subtotal	0.850	2.354	3.204
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.001	0.016	0.018
Collision with fixed object (from Worksheet 1F)	0.035	0.255	0.290
Collision with other object (from Worksheet 1F)	0.000	0.020	0.021
Other single-vehicle collision (from Worksheet 1F)	0.051	0.041	0.092
Collision with pedestrian (from Worksheet 1I)	0.083	0.000	0.083
Collision with bicycle (from Worksheet 1J)	0.043	0.000	0.043
Subtotal	0.215	0.332	0.547
Total	1.065	2.686	3.751

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	3.8	0.18	20.8
Fatal and injury (FI)	1.1	0.18	5.9
Property damage only (PDO)	2.7	0.18	14.9

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

General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Old Willow Rd. to Wagner
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data	Base Conditions	Site Conditions	
Roadway type (2U, 3T, 4U, 4D, ST)	--	5T	
Length of segment, L (mi)	--	0.42	
AADT (veh/day)	--	36,000	
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)	--	12	
Other driveways (number)	--	0	
Speed Category	--	Posted Speed Greater than 30 mph	
Roadside fixed object density (fixed objects / mi)	0	5	
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]	30	7	
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	1.00	1.00	1.00

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 Equation 12-10	(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(6)*(7)*(8)
	a	b											
Total	-9.70	1.17	0.81	5.514	1.000	5.514	1.00	1.00	5.514				
Fatal and Injury (FI)	-10.47	1.12	0.62	1.511	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.264	1.456	1.00	1.00	1.456				
Property Damage Only (PDO)	-9.97	1.17	0.88	4.209	$(5)_{TOTAL}-(5)_{FI}$ 0.736	4.058	1.00	1.00	4.058				

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	1.456	1.000	4.058	5.514
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.846	1.232	0.651	2.641	3.874
Head-on collision	0.021	0.031	0.004	0.016	0.047
Angle collision	0.050	0.073	0.059	0.239	0.312
Sideswipe, same direction	0.061	0.089	0.248	1.006	1.095
Sideswipe, opposite direction	0.004	0.006	0.009	0.037	0.042
Other multiple-vehicle collision	0.018	0.026	0.029	0.118	0.144

Worksheet 1E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
	SPF Coefficients		Overdispersion 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)
Total	a	b	0.52	0.978	1.000	0.978	1.00	1.00	0.978
Fatal and Injury (FI)	-4.82	0.54	0.36	0.197	(4) _{FI} /((4) _{FI} +(4) _{PDO})	0.205	1.00	1.00	0.205
Property Damage Only (PDO)	-4.43	0.35	0.55	0.742	(5) _{TOTAL} -(5) _{FI}	0.773	1.00	1.00	0.773
	-5.83	0.61			0.790				

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	0.205	1.000	0.773	0.978
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.016	0.003	0.049	0.038	0.041
Collision with fixed object	0.398	0.082	0.768	0.594	0.675
Collision with other object	0.005	0.001	0.061	0.047	0.048
Other single-vehicle collision	0.581	0.119	0.122	0.094	0.213

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_i from Table 12-7	Coefficient for traffic adjustment, t from Table 12-7	Initial N_{brdwy}	Overdispersion parameter, k from Table 12-7	
				Equation 12-16 $n_j * N_j * (AADT/15,000)^t$		
Major commercial	0	0.165	1.172	0.000	--	
Minor commercial	0	0.053	1.172	0.000		
Major industrial/institutional	0	0.181	1.172	0.000		
Minor industrial/institutional	0	0.024	1.172	0.000		
Major residential	0	0.087	1.172	0.000		
Minor residential	12	0.016	1.172	0.536		
Other	0	0.027	1.172	0.000		
Total	--	--	--	0.536		0.10

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}) from Table 12-7	Adjusted N_{brdwy} (2) _{TOTAL} * (3)	Combined CMFs (6) from Worksheet 1B	Calibration factor, C_r	Predicted N_{brdwy} (4)*(5)*(6)
	(5) _{TOTAL} from Worksheet 1G					
Total	0.536	1.000	0.536	1.00	1.00	0.536
Fatal and injury (FI)	--	0.269	0.144	1.00	1.00	0.144
Property damage only (PDO)	--	0.731	0.392	1.00	1.00	0.392

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr} from Table 12-8	Calibration factor, C_r	Predicted N_{pedr} (5)*(6)*(7)
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			
Total	5.514	0.978	0.536	7.028	0.023	1.00	0.162
Fatal and injury (FI)	--	--	--	--	--	1.00	0.162

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker} from Table 12-9	Calibration factor, C_r	Predicted N_{biker} (5)*(6)*(7)
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			
Total	5.514	0.978	0.536	7.028	0.012	1.00	0.084
Fatal and injury (FI)	--	--	--	--	--	1.00	0.084

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)	1.232	2.641	3.874
Head-on collisions (from Worksheet 1D)	0.031	0.016	0.047
Angle collisions (from Worksheet 1D)	0.073	0.239	0.312
Sideswipe, same direction (from Worksheet 1D)	0.089	1.006	1.095
Sideswipe, opposite direction (from Worksheet 1D)	0.006	0.037	0.042
Driveway-related collisions (from Worksheet 1H)	0.144	0.392	0.536
Other multiple-vehicle collision (from Worksheet 1D)	0.026	0.118	0.144
Subtotal	1.601	4.449	6.050
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.003	0.038	0.041
Collision with fixed object (from Worksheet 1F)	0.082	0.594	0.675
Collision with other object (from Worksheet 1F)	0.001	0.047	0.048
Other single-vehicle collision (from Worksheet 1F)	0.119	0.094	0.213
Collision with pedestrian (from Worksheet 1I)	0.162	0.000	0.162
Collision with bicycle (from Worksheet 1J)	0.084	0.000	0.084
Subtotal	0.451	0.773	1.224
Total	2.051	5.222	7.274

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Crash Severity Level	Predicted average crash frequency, $N_{\text{predicted } rs}$ (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)
	(Total) from Worksheet 1K		(2) / (3)
Total	7.3	0.42	17.3
Fatal and injury (FI)	2.1	0.42	4.9
Property damage only (PDO)	5.2	0.42	12.4

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

General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Sunset Ridge to Old Willow Rd
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	3T
Length of segment, L (mi)		--	0.18
AADT (veh/day)		--	36,000
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)		--	1
Major industrial / institutional driveways (number)		--	1
Minor industrial / institutional driveways (number)		--	0
Major residential driveways (number)		--	0
Minor residential driveways (number)		--	4
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	11
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	7
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	1.01	1.00	1.00	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								
	a	b	from Table 12-3	from Equation 12-10	(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(6)*(7)*(8)		
Total	-12.40	1.41	0.66	1.970	1.000	1.970	1.01	1.00	1.982
Fatal and Injury (FI)	-16.45	1.69	0.59	0.648	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.327	0.644	1.01	1.00	0.648
Property Damage Only (PDO)	-11.95	1.33	0.59	1.335	$(5)_{TOTAL} - (5)_{FI}$ 0.673	1.326	1.01	1.00	1.335

Worksheet 1D -- Multiple-Vehicle Nondrivable 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	0.648	1.000	1.335	1.982
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.845	0.547	0.842	1.124	1.671
Head-on collision	0.034	0.022	0.020	0.027	0.049
Angle collision	0.069	0.045	0.020	0.027	0.071
Sideswipe, same direction	0.001	0.001	0.078	0.104	0.105
Sideswipe, opposite direction	0.017	0.011	0.020	0.027	0.038
Other multiple-vehicle collision	0.034	0.022	0.020	0.027	0.049

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 (6) from Worksheet 1B	Calibration Factor, Cr	Predicted N _{brsv}
	from Table 12-5								
	a	b							
Total	-5.74	0.54	1.37	0.167	1.000	0.167	1.01	1.00	0.168
Fatal and Injury (FI)	-6.37	0.47	1.06	0.043	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.264	0.044	1.01	1.00	0.044
Property Damage Only (PDO)	-6.29	0.56	1.93	0.119	(5) _{TOTAL} -(5) _{FI} 0.736	0.123	1.01	1.00	0.124

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	0.044	1.000	0.124	0.168
		(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	0.031	0.963	0.119	0.150
Collision with other object	0.001	0.000	0.001	0.000	0.000
Other single-vehicle collision	0.310	0.014	0.035	0.004	0.018

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_i	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	1	0.032	1.000	0.077	
Major industrial/institutional	1	0.110	1.000	0.264	
Minor industrial/institutional	0	0.015	1.000	0.000	
Major residential	0	0.053	1.000	0.000	
Minor residential	4	0.010	1.000	0.096	
Other	0	0.016	1.000	0.000	
Total	--	--	--	0.437	

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	0.437	1.000	0.437	1.01	1.00	0.440
Fatal and injury (FI)	--	0.243	0.106	1.01	1.00	0.107
Property damage only (PDO)	--	0.757	0.331	1.01	1.00	0.333

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr}	Calibration factor, C_r	Predicted N_{pedr}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	1.982	0.168	0.440	2.590	0.013	1.00	0.034
Fatal and injury (FI)	--	--	--	--	--	1.00	0.034

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker}	Calibration factor, C_r	Predicted N_{biker}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	1.982	0.168	0.440	2.590	0.007	1.00	0.018
Fatal and injury (FI)	--	--	--	--	--	1.00	0.018

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)	0.547	1.124	1.671
Head-on collisions (from Worksheet 1D)	0.022	0.027	0.049
Angle collisions (from Worksheet 1D)	0.045	0.027	0.071
Sideswipe, same direction (from Worksheet 1D)	0.001	0.104	0.105
Sideswipe, opposite direction (from Worksheet 1D)	0.011	0.027	0.038
Driveway-related collisions (from Worksheet 1H)	0.107	0.333	0.440
Other multiple-vehicle collision (from Worksheet 1D)	0.022	0.027	0.049
Subtotal	0.754	1.667	2.422
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 1F)	0.031	0.119	0.150
Collision with other object (from Worksheet 1F)	0.000	0.000	0.000
Other single-vehicle collision (from Worksheet 1F)	0.014	0.004	0.018
Collision with pedestrian (from Worksheet 1I)	0.034	0.000	0.034
Collision with bicycle (from Worksheet 1J)	0.018	0.000	0.018
Subtotal	0.096	0.124	0.220
Total	0.851	1.791	2.642

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Crash Severity Level	Predicted average crash frequency, $N_{\text{predicted rs}}$ (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)
	(Total) from Worksheet 1K		(2) / (3)
Total	2.6	0.18	14.7
Fatal and injury (FI)	0.9	0.18	4.7
Property damage only (PDO)	1.8	0.18	10.0

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

General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Old Willow Rd. to Wagner
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	3T
Length of segment, L (mi)		--	0.42
AADT (veh/day)		--	36,000
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)		--	12
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	5
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	7
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	1.00	1.00	1.00

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								
	a	b	from Table 12-3	from Equation 12-10	(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(6)*(7)*(8)		
Total	-12.40	1.41	0.66	4.596	1.000	4.596	1.00	1.00	4.596
Fatal and Injury (FI)	-16.45	1.69	0.59	1.511	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.327	1.502	1.00	1.00	1.502
Property Damage Only (PDO)	-11.95	1.33	0.59	3.114	$(5)_{TOTAL} - (5)_{FI}$ 0.673	3.095	1.00	1.00	3.095

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	1.502	1.000	3.095	4.596
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.845	1.269	0.842	2.606	3.874
Head-on collision	0.034	0.051	0.020	0.062	0.113
Angle collision	0.069	0.104	0.020	0.062	0.165
Sideswipe, same direction	0.001	0.002	0.078	0.241	0.243
Sideswipe, opposite direction	0.017	0.026	0.020	0.062	0.087
Other multiple-vehicle collision	0.034	0.051	0.020	0.062	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 (6) from Worksheet 1B	Calibration Factor, Cr	Predicted N _{brsv}
	from Table 12-5								
	a	b	from Table 12-5	from Equation 12-13	(4) _{TOTAL} *(5)	(6)*(7)*(8)			
Total	-5.74	0.54	1.37	0.390	1.000	0.390	1.00	1.00	0.390
Fatal and Injury (FI)	-6.37	0.47	1.06	0.100	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.264	0.103	1.00	1.00	0.103
Property Damage Only (PDO)	-6.29	0.56	1.93	0.277	(5) _{TOTAL} -(5) _{FI} 0.736	0.287	1.00	1.00	0.287

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	0.103	1.000	0.287	0.390
		(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	0.071	0.963	0.276	0.347
Collision with other object	0.001	0.000	0.001	0.000	0.000
Other single-vehicle collision	0.310	0.032	0.035	0.010	0.042

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_i from Table 12-7	Coefficient for traffic adjustment, t from Table 12-7	Initial N_{brdwy}	Overdispersion parameter, k from Table 12-7
				Equation 12-16 $n_j * N_i * (AADT/15,000)^t$	
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	0	0.053	1.000	0.000	
Minor residential	12	0.010	1.000	0.288	
Other	0	0.016	1.000	0.000	
Total	--	--	--	0.288	

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	0.288	1.000	0.288	1.00	1.00	0.288
Fatal and injury (FI)	--	0.243	0.070	1.00	1.00	0.070
Property damage only (PDO)	--	0.757	0.218	1.00	1.00	0.218

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr}	Calibration factor, C_r	Predicted N_{pedr}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	4.596	0.390	0.288	5.274	0.013	1.00	0.069
Fatal and injury (FI)	--	--	--	--	--	1.00	0.069

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker}	Calibration factor, C_r	Predicted N_{biker}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	4.596	0.390	0.288	5.274	0.007	1.00	0.037
Fatal and injury (FI)	--	--	--	--	--	1.00	0.037

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)	1.269	2.606	3.874
Head-on collisions (from Worksheet 1D)	0.051	0.062	0.113
Angle collisions (from Worksheet 1D)	0.104	0.062	0.165
Sideswipe, same direction (from Worksheet 1D)	0.002	0.241	0.243
Sideswipe, opposite direction (from Worksheet 1D)	0.026	0.062	0.087
Driveway-related collisions (from Worksheet 1H)	0.070	0.218	0.288
Other multiple-vehicle collision (from Worksheet 1D)	0.051	0.062	0.113
Subtotal	1.572	3.313	4.884
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 1F)	0.071	0.276	0.347
Collision with other object (from Worksheet 1F)	0.000	0.000	0.000
Other single-vehicle collision (from Worksheet 1F)	0.032	0.010	0.042
Collision with pedestrian (from Worksheet 1I)	0.069	0.000	0.069
Collision with bicycle (from Worksheet 1J)	0.037	0.000	0.037
Subtotal	0.208	0.287	0.495
Total	1.780	3.599	5.379

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Crash Severity Level	Predicted average crash frequency, $N_{\text{predicted rs}}$ (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)
	(Total) from Worksheet 1K		(2) / (3)
Total	5.4	0.42	12.8
Fatal and injury (FI)	1.8	0.42	4.2
Property damage only (PDO)	3.6	0.42	8.6

**Alternative 4B
Intersection Analysis
Willow Road/Sunset Ridge Road**

Willow Road at Sunset Ridge Road - **Alternative 4B (Unbalanced 3-Lane with Median - 2 Lanes Eastbound)**
 Urban and Suburban Arterial Predictive Method

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections		
General Information		Location Information
Analyst	R. Jacox	Roadway
Agency or Company	TranSystems	Intersection
Date Performed	03/10/11	Jurisdiction
		Analysis Year
		Willow Road at Sunset Ridge Road
		IDOT
		2040
Input Data	Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)	--	4SG
AADT _{major} (veh/day)	--	39,000
AADT _{minor} (veh/day)	--	12,000
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	4
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]	--	4
Type of left-turn signal phasing for Leg #1	Permissive	Protected / Permissive
Type of left-turn signal phasing for Leg #2	--	Protected / Permissive
Type of left-turn signal phasing for Leg #3	--	Protected / Permissive
Type of left-turn signal phasing for Leg #4 (if applicable)	--	Protected / Permissive
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		110
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	1
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
<i>CMF 1i</i>	<i>CMF 2i</i>	<i>CMF 3i</i>	<i>CMF 4i</i>	<i>CMF 5i</i>	<i>CMF 6i</i>	<i>CMF_{COMB}</i>
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	0.96	0.96	0.98	1.00	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	Calibration Factor, C_i	Predicted N_{bimv}
	from Table 12-10									
	a	b	c							
Total	-10.99	1.07	0.23	0.39	11.961	1.000	11.961	0.60	1.00	7.134
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	4.057	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.351	4.193	0.60	1.00	2.501
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	7.516	$(5)_{TOTAL}-(5)_{FI}$ 0.649	7.767	0.60	1.00	4.633

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/yea)	Predicted $N_{bimv (TOTAL)}$ (crashes/year)
	from Table 12-11	(9) _{FI} from Worksheet 2C	from Table 12-11	(9) _{PDO} from Worksheet	(9) _{PDO} from Worksheet 2C
Total	1.000	2.501	1.000	4.633	7.134
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	$(3)+(5)$
Rear-end collision	0.450	1.126	0.483	2.238	3.363
Head-on collision	0.049	0.123	0.030	0.139	0.262
Angle collision	0.347	0.868	0.244	1.130	1.998
Sideswipe	0.099	0.248	0.032	0.148	0.396
Other multiple-vehicle collision	0.055	0.138	0.211	0.978	1.115

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_{bisv}	Combined	Calibration Factor, C_i	Predicted N_{bisv}
	from Table 12-12									
	a	b	c							
Total	-10.21	0.68	0.27	0.36	0.615	1.000	0.615	0.60	1.00	0.367
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.138	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.225	0.139	0.60	1.00	0.083
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.474	$(5)_{TOTAL}-(5)_{FI}$ 0.775	0.477	0.60	1.00	0.284

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/yea)	Predicted N _{bisv (TOTAL)} (crashes/year)
	from Table 12-13	(9) _{FI} from Worksheet 2E	from Table 12-13	(9) _{PDO} from Worksheet	(9) _{PDO} from Worksheet 2E
Total	1.000	0.083	1.000	0.284	0.367
		(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	0.062	0.870	0.247	0.309
Collision with other object	0.072	0.006	0.070	0.020	0.026
Other single-vehicle collision	0.040	0.003	0.023	0.007	0.010
Single-vehicle noncollision	0.141	0.012	0.034	0.010	0.021

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Calibration factor, C _i	Predicted N _{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	--	--	--	--	1.00	--
Fatal and injury (FI)	--	--	--	--	1.00	--

Worksheet 2H -- Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections				
(1)	(2)	(3)	(4)	(5)
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	W/DW Ped Signals with Countdown Ped Signals	Combined CMF
CMF _{1p}	CMF _{2p}	CMF _{3p}	CMF _{4p}	
from Table 12-28	from Table 12-29	from Table 12-30	cmfclearinghouse.org	(1)*(2)*(3)*(4)
2.78	1.35	1.00	0.75	2.81

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 r, k	N _{pedbase}	Combined CMF	Calibration factor, C _i	Predicted N _{pedi}
	from Table 12-14									
	a	b	c	d	e					
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.041	2.81	1.00	0.116
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	0.116

Worksheet 2J -- Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N_{bimv}	Predicted N_{bisv}	Predicted N_{bi}	f_{bikei}	Calibration factor, C_i	Predicted N_{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	7.134	0.367	7.501	0.015	1.00	0.113
Fatal and injury (FI)	--	--	--	--	1.00	0.113

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)	1.126	2.238	3.363
Head-on collisions (from Worksheet 2D)	0.123	0.139	0.262
Angle collisions (from Worksheet 2D)	0.868	1.130	1.998
Sideswipe (from Worksheet 2D)	0.248	0.148	0.396
Other multiple-vehicle collision (from Worksheet 2D)	0.138	0.978	1.115
Subtotal	2.501	4.633	7.134
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)	0.062	0.247	0.309
Collision with other object (from Worksheet 2F)	0.006	0.020	0.026
Other single-vehicle collision (from Worksheet 2F)	0.003	0.007	0.010
Single-vehicle noncollision (from Worksheet 2F)	0.012	0.010	0.021
Collision with pedestrian (from Worksheet 2G or 2I)	0.116	0.000	0.116
Collision with bicycle (from Worksheet 2J)	0.113	0.000	0.113
Subtotal	0.312	0.284	0.596
Total	2.813	4.917	7.730

Worksheet 2L -- Summary Results for Urban and Suburban Arterial Intersections	
(1)	(2)
Crash severity level	Predicted average crash frequency, $N_{predicted}$ <i>int</i> (crashes/year)
	(Total) from Worksheet 2K
Total	7.7
Fatal and injury (FI)	2.8
Property damage only (PDO)	4.9

Alternative 5
Willow Road 2-Lane with Roundabouts
Safety Performance Calculations

**Alternative 5
Segment Analysis
Willow Road – Sunset Ridge Road to Wagner Road**

Willow Road - Sunset Ridge Road to Wagner Road
2040 Predicted Crash Frequency
Alternative 5 (2-Lane with Roundabouts)

	Predicted Crash Frequency (Crashes/Year)		
	Fatality-Injury	Property Damage Only	Total
Segment 1, Sunset Ridge to Old Willow	0.7	1.6	2.3
Segment 2, Old Willow to Wagner	1.5	3.1	4.6
Total Crashes	2.2	4.7	6.9

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

General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Sunset Ridge to Old Willow Rd
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	3T
Length of segment, L (mi)		--	0.18
AADT (veh/day)		--	32,000
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)		--	1
Major industrial / institutional driveways (number)		--	1
Minor industrial / institutional driveways (number)		--	0
Major residential driveways (number)		--	0
Minor residential driveways (number)		--	4
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	11
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	7
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	1.01	1.00	1.00	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								
	a	b	from Table 12-3	from Equation 12-10	(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(6)*(7)*(8)		
Total	-12.40	1.41	0.66	1.668	1.000	1.668	1.01	1.00	1.679
Fatal and Injury (FI)	-16.45	1.69	0.59	0.531	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.317	0.530	1.01	1.00	0.533
Property Damage Only (PDO)	-11.95	1.33	0.59	1.141	$(5)_{TOTAL} - (5)_{FI}$ 0.683	1.139	1.01	1.00	1.146

Worksheet 1D -- Multiple-Vehicle Nondrivable 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	0.533	1.000	1.146	1.679
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.845	0.450	0.842	0.965	1.415
Head-on collision	0.034	0.018	0.020	0.023	0.041
Angle collision	0.069	0.037	0.020	0.023	0.060
Sideswipe, same direction	0.001	0.001	0.078	0.089	0.090
Sideswipe, opposite direction	0.017	0.009	0.020	0.023	0.032
Other multiple-vehicle collision	0.034	0.018	0.020	0.023	0.041

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 (6) from Worksheet 1B	Calibration Factor, Cr	Predicted N _{brsv}
	from Table 12-5		from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)			(6)*(7)*(8)
	a	b							
Total	-5.74	0.54	1.37	0.157	1.000	0.157	1.01	1.00	0.158
Fatal and Injury (FI)	-6.37	0.47	1.06	0.040	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.266	0.042	1.01	1.00	0.042
Property Damage Only (PDO)	-6.29	0.56	1.93	0.111	(5) _{TOTAL} -(5) _{FI} 0.734	0.115	1.01	1.00	0.116

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	0.042	1.000	0.116	0.158
		(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	0.029	0.963	0.111	0.140
Collision with other object	0.001	0.000	0.001	0.000	0.000
Other single-vehicle collision	0.310	0.013	0.035	0.004	0.017

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_i	Coefficient for traffic adjustment, t	Initial N_{brdwy}	Overdispersion parameter, k
		from Table 12-7	from Table 12-7	Equation 12-16 $n_i * N_j * (AADT/15,000)^i$	from Table 12-7
Major commercial	0	0.102	1.000	0.000	--
Minor commercial	1	0.032	1.000	0.068	
Major industrial/institutional	1	0.110	1.000	0.235	
Minor industrial/institutional	0	0.015	1.000	0.000	
Major residential	0	0.053	1.000	0.000	
Minor residential	4	0.010	1.000	0.085	
Other	0	0.016	1.000	0.000	
Total	--	--	--	0.388	

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	0.388	1.000	0.388	1.01	1.00	0.391
Fatal and injury (FI)	--	0.243	0.094	1.01	1.00	0.095
Property damage only (PDO)	--	0.757	0.294	1.01	1.00	0.296

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr}	Calibration factor, C_r	Predicted N_{pedr}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	1.679	0.158	0.391	2.227	0.013	1.00	0.029
Fatal and injury (FI)	--	--	--	--	--	1.00	0.029

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker}	Calibration factor, C_r	Predicted N_{biker}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	1.679	0.158	0.391	2.227	0.007	1.00	0.016
Fatal and injury (FI)	--	--	--	--	--	1.00	0.016

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)	0.450	0.965	1.415
Head-on collisions (from Worksheet 1D)	0.018	0.023	0.041
Angle collisions (from Worksheet 1D)	0.037	0.023	0.060
Sideswipe, same direction (from Worksheet 1D)	0.001	0.089	0.090
Sideswipe, opposite direction (from Worksheet 1D)	0.009	0.023	0.032
Driveway-related collisions (from Worksheet 1H)	0.095	0.296	0.391
Other multiple-vehicle collision (from Worksheet 1D)	0.018	0.023	0.041
Subtotal	0.628	1.442	2.070
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 1F)	0.029	0.111	0.140
Collision with other object (from Worksheet 1F)	0.000	0.000	0.000
Other single-vehicle collision (from Worksheet 1F)	0.013	0.004	0.017
Collision with pedestrian (from Worksheet 1I)	0.029	0.000	0.029
Collision with bicycle (from Worksheet 1J)	0.016	0.000	0.016
Subtotal	0.087	0.116	0.202
Total	0.714	1.558	2.272

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Crash Severity Level	Predicted average crash frequency, $N_{\text{predicted}}$ (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)
	(Total) from Worksheet 1K		(2) / (3)
Total	2.3	0.18	12.6
Fatal and injury (FI)	0.7	0.18	4.0
Property damage only (PDO)	1.6	0.18	8.7

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

General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Old Willow Rd. to Wagner
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	3T
Length of segment, L (mi)		--	0.42
AADT (veh/day)		--	32,000
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)		--	12
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	5
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	7
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	1.00	1.00	1.00

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								
	a	b	from Table 12-3	from Equation 12-10	(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(6)*(7)*(8)		
Total	-12.40	1.41	0.66	3.893	1.000	3.893	1.00	1.00	3.893
Fatal and Injury (FI)	-16.45	1.69	0.59	1.238	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.317	1.236	1.00	1.00	1.236
Property Damage Only (PDO)	-11.95	1.33	0.59	2.662	$(5)_{TOTAL} - (5)_{FI}$ 0.683	2.657	1.00	1.00	2.657

Worksheet 1D -- Multiple-Vehicle Nondrivable 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		1.236	1.000	2.657	3.893
			(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.845		1.044	0.842	2.237	3.281
Head-on collision	0.034		0.042	0.020	0.053	0.095
Angle collision	0.069		0.085	0.020	0.053	0.138
Sideswipe, same direction	0.001		0.001	0.078	0.207	0.208
Sideswipe, opposite direction	0.017		0.021	0.020	0.053	0.074
Other multiple-vehicle collision	0.034		0.042	0.020	0.053	0.095

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 (6) from Worksheet 1B	Calibration Factor, Cr	Predicted N _{brsv}
	from Table 12-5		from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)			(6)*(7)*(8)
	a	b							
Total	-5.74	0.54	1.37	0.366	1.000	0.366	1.00	1.00	0.366
Fatal and Injury (FI)	-6.37	0.47	1.06	0.094	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.266	0.097	1.00	1.00	0.097
Property Damage Only (PDO)	-6.29	0.56	1.93	0.260	(5) _{TOTAL} -(5) _{FI} 0.734	0.268	1.00	1.00	0.268

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	0.097	1.000	0.268	0.366
		(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	0.067	0.963	0.258	0.325
Collision with other object	0.001	0.000	0.001	0.000	0.000
Other single-vehicle collision	0.310	0.030	0.035	0.009	0.040

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_i from Table 12-7	Coefficient for traffic adjustment, t from Table 12-7	Initial N_{brdwy}	Overdispersion parameter, k from Table 12-7
				Equation 12-16 $n_j * N_j * (AADT/15,000)^t$	
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	0	0.053	1.000	0.000	
Minor residential	12	0.010	1.000	0.256	
Other	0	0.016	1.000	0.000	
Total	--	--	--	0.256	

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	0.256	1.000	0.256	1.00	1.00	0.256
Fatal and injury (FI)	--	0.243	0.062	1.00	1.00	0.062
Property damage only (PDO)	--	0.757	0.194	1.00	1.00	0.194

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr}	Calibration factor, C_r	Predicted N_{pedr}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	3.893	0.366	0.256	4.515	0.013	1.00	0.059
Fatal and injury (FI)	--	--	--	--	--	1.00	0.059

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker}	Calibration factor, C_r	Predicted N_{biker}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	3.893	0.366	0.256	4.515	0.007	1.00	0.032
Fatal and injury (FI)	--	--	--	--	--	1.00	0.032

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)	1.044	2.237	3.281
Head-on collisions (from Worksheet 1D)	0.042	0.053	0.095
Angle collisions (from Worksheet 1D)	0.085	0.053	0.138
Sideswipe, same direction (from Worksheet 1D)	0.001	0.207	0.208
Sideswipe, opposite direction (from Worksheet 1D)	0.021	0.053	0.074
Driveway-related collisions (from Worksheet 1H)	0.062	0.194	0.256
Other multiple-vehicle collision (from Worksheet 1D)	0.042	0.053	0.095
Subtotal	1.298	2.851	4.149
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 1F)	0.067	0.258	0.325
Collision with other object (from Worksheet 1F)	0.000	0.000	0.000
Other single-vehicle collision (from Worksheet 1F)	0.030	0.009	0.040
Collision with pedestrian (from Worksheet 1I)	0.059	0.000	0.059
Collision with bicycle (from Worksheet 1J)	0.032	0.000	0.032
Subtotal	0.188	0.268	0.456
Total	1.486	3.119	4.605

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Crash Severity Level	Predicted average crash frequency, $N_{\text{predicted}}$ (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)
	(Total) from Worksheet 1K		(2) / (3)
Total	4.6	0.42	11.0
Fatal and injury (FI)	1.5	0.42	3.5
Property damage only (PDO)	3.1	0.42	7.4

**Alternative 5
Intersection Analysis
Willow Road/Sunset Ridge Road**

Note: The Interim Predictive Method for Roundabouts has been applied as outlined in Section 12.9 of Volume 2 of the HSM.

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections			
General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Intersection	at Sunset Ridge Road
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)		--	4SG
AADT _{major} (veh/day)		--	37,000
AADT _{minor} (veh/day)		--	12,000
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	4
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	1
Intersection red light cameras (present/not present)		Not Present	Not Present
Sum of all pedestrian crossing volumes (PedVol) -- Signalized intersections only			110
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	1
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
<i>CMF_{1i}</i>	<i>CMF_{2i}</i>	<i>CMF_{3i}</i>	<i>CMF_{4i}</i>	<i>CMF_{5i}</i>	<i>CMF_{6i}</i>	<i>CMF_{COMB}</i>
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	0.96	0.98	1.00	1.00	0.62

Worksheet 2C -- Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections										
(1) Crash Severity Level	(2) SPF Coefficients			(3) Overdispersion Parameter, k	(4) Initial N_{bimv} from Equation	(5) Proportion of Total Crashes	(6) Adjusted N_{bimv} (4) _{TOTAL} *(5)	(7) Combined (7) from Worksh	(8) Calibration Factor, C_i	(9) Predicted N_{bimv} (6)*(7)*(8)
	from Table 12-10									
	a	b	c							
Total	-10.99	1.07	0.23	0.39	11.306	1.000	11.306	0.62	1.00	7.020
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	3.813	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.349	3.942	0.62	1.00	2.448
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	7.123	$(5)_{TOTAL} - (5)_{FI}$ 0.651	7.364	0.62	1.00	4.572

Worksheet 2D -- Multiple-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections								
(1) Collision Type	(2) Proportion of Collision Type _(FI) from Table 12-11	(3) Predicted $N_{bimv (FI)}$ (crashes/year) (9) _{FI} from Worksheet 2C	(4) Proportion of Collision Type (PDO) from Table 12-11	(5) Predicted $N_{bimv (PDO)}$ (crashes/yea) (9) _{PDO} from Worksheet	(6) Predicted $N_{bimv (TOTAL)}$ (crashes/year) (9) _{PDO} from Worksheet 2C			
						(2)*(3) _{FI}	(4)*(5) _{PDO}	(3)+(5)
						Total	1.000	2.448
Rear-end collision	0.450	1.101	0.483	2.208	3.310			
Head-on collision	0.049	0.120	0.030	0.137	0.257			
Angle collision	0.347	0.849	0.244	1.116	1.965			
Sideswipe	0.099	0.242	0.032	0.146	0.389			
Other multiple-vehicle collision	0.055	0.135	0.211	0.965	1.099			

Worksheet 2E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections										
(1) Crash Severity Level	(2) SPF Coefficients			(3) Overdispersion Parameter, k	(4) Initial N_{bisv} from Eqn. 12-24; (FI) from Eqn.	(5) Proportion of Total Crashes	(6) Adjusted N_{bisv} (4) _{TOTAL} *(5)	(7) Combined (7) from Worksh	(8) Calibration Factor, C_i	(9) Predicted N_{bisv} (6)*(7)*(8)
	from Table 12-12									
	a	b	c							
Total	-10.21	0.68	0.27	0.36	0.594	1.000	0.594	0.62	1.00	0.369
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.135	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.229	0.136	0.62	1.00	0.084
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.455	$(5)_{TOTAL} - (5)_{FI}$ 0.771	0.458	0.62	1.00	0.284

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/yea	Predicted N _{bisv (TOTAL)} (crashes/year)
	from Table 12-13	(9) _{FI} from Worksheet 2E	from Table 12-13	(9) _{PDO} from Worksheet	(9) _{PDO} from Worksheet 2E
Total	1.000	0.084	1.000	0.284	0.369
		(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	0.063	0.870	0.247	0.310
Collision with other object	0.072	0.006	0.070	0.020	0.026
Other single-vehicle collision	0.040	0.003	0.023	0.007	0.010
Single-vehicle noncollision	0.141	0.012	0.034	0.010	0.022

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{hi}	f _{pedi}	Calibration factor, C _i	Predicted N _{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	--	--	--	--	1.00	--
Fatal and injury (FI)	--	--	--	--	1.00	--

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	1.35	1.00	3.75

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 r, k	N _{pedbase} from Equation 12-29	Combined CMF (4) from Worksheet 2H	Calibration factor, C _i	Predicted N _{pedi} (4)*(5)*(6)
	from Table 12-14									
	a	b	c	d	e					
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.041	3.75	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)	(6)	(7)
Crash Severity Level	Predicted N_{bimv}	Predicted N_{bisv}	Predicted N_{bi}	f_{bike}	Calibration factor, C_i	Predicted N_{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	7.020	0.369	7.389	0.015	1.00	0.111
Fatal and injury (FI)	--	--	--	--	1.00	0.111

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections				
(1)	(2)	(3)	(4)	(5)
Collision type	Fatal and injury (FI)	Property damage only (PDO)	Total	Roundabout 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	See HSM Section 12.9
MULTIPLE-VEHICLE				
Rear-end collisions (from Worksheet 2D)	1.101	2.208	3.310	1.721
Head-on collisions (from Worksheet 2D)	0.120	0.137	0.257	0.134
Angle collisions (from Worksheet 2D)	0.849	1.116	1.965	1.022
Sideswipe (from Worksheet 2D)	0.242	0.146	0.389	0.202
Other multiple-vehicle collision (from Worksheet 2D)	0.135	0.965	1.099	0.572
Subtotal	2.448	4.572	7.020	3.650
SINGLE-VEHICLE				
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.001	0.001	0.000
Collision with fixed object (from Worksheet 2F)	0.063	0.247	0.310	0.161
Collision with other object (from Worksheet 2F)	0.006	0.020	0.026	0.014
Other single-vehicle collision (from Worksheet 2F)	0.003	0.007	0.010	0.005
Single-vehicle noncollision (from Worksheet 2F)	0.012	0.010	0.022	0.011
Collision with pedestrian (from Worksheet 2G or 2I)	0.155	0.000	0.155	0.081
Collision with bicycle (from Worksheet 2J)	0.111	0.000	0.111	0.058
Subtotal	0.350	0.284	0.634	0.330
Total	2.798	4.857	7.654	3.980

Worksheet 2L -- Summary Results for Urban and Suburban Arterial Intersections		
(1)	(2)	(3)
Crash severity level	Predicted average crash frequency, $N_{predicted\ int}$ (crashes/year)	Predicted average crash frequency with Roundabout Adjustment* (crashes/year)
	(Total) from Worksheet 2K	See HSM Section 12.9
Total	7.7	4.0
Fatal and injury (FI)	2.8	1.5
Property damage only (PDO)	4.9	2.5

* Roundabout adjustment is 0.52, per HSM Section 12.9

Alternative 6
Dundee Road Add Lanes – IL Route 43 to I-94

Safety Performance Calculations

Willow Road - Sunset Ridge Road to Wagner Road
2040 Predicted Crash Frequency
Alternative 6 (Dundee Road Add Lanes - IL Route 43 to I-94)

	Predicted Crash Frequency (Crashes/Year)		
	Fatality-Injury	Property Damage Only	Total
Segment 1, Sunset Ridge to Old Willow	0.8	2.0	2.8
Intersection 1, Willow at Old Willow	1.6	3.1	4.7
Segment 2, Old Willow to Wagner	1.3	3.4	4.7
Total Crashes	3.7	8.5	12.2

Totals may not add due to rounding.

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

General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Sunset Ridge to Old Willow Rd
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	2U
Length of segment, L (mi)		--	0.18
AADT (veh/day)		--	32,000
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)		--	1
Major industrial / institutional driveways (number)		--	1
Minor industrial / institutional driveways (number)		--	0
Major residential driveways (number)		--	0
Minor residential driveways (number)		--	4
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	56
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	23
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	1.11	1.00	1.00	1.00	1.11

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 (6) from Worksheet 1B	Calibration Factor, Cr	Predicted N_{brmv}
	from Table 12-3								
	a	b							
Total	-15.22	1.68	0.84	1.637	1.000	1.637	1.11	1.00	1.821
Fatal and Injury (FI)	-16.22	1.66	0.65	0.489	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.287	0.469	1.11	1.00	0.522
Property Damage Only (PDO)	-15.62	1.69	0.87	1.217	$(5)_{TOTAL} - (5)_{FI}$ 0.713	1.167	1.11	1.00	1.299

Worksheet 1D -- Multiple-Vehicle Nondrivable 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		0.522	1.000	1.299	1.821
			(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.730		0.381	0.778	1.011	1.392
Head-on collision	0.068		0.036	0.004	0.005	0.041
Angle collision	0.085		0.044	0.079	0.103	0.147
Sideswipe, same direction	0.015		0.008	0.031	0.040	0.048
Sideswipe, opposite direction	0.073		0.038	0.055	0.071	0.110
Other multiple-vehicle collision	0.029		0.015	0.053	0.069	0.084

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 (6) from Worksheet 1B	Calibration Factor, Cr	Predicted N _{brsv}
	from Table 12-5		from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)			(6)*(7)*(8)
	a	b							
Total	-5.47	0.56	0.81	0.253	1.000	0.253	1.11	1.00	0.281
Fatal and Injury (FI)	-3.96	0.23	0.50	0.037	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.154	0.039	1.11	1.00	0.043
Property Damage Only (PDO)	-6.51	0.64	0.87	0.205	(5) _{TOTAL} -(5) _{FI} 0.846	0.214	1.11	1.00	0.238

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	0.043	1.000	0.238	0.281
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.026	0.001	0.066	0.016	0.017
Collision with fixed object	0.723	0.031	0.759	0.181	0.212
Collision with other object	0.010	0.000	0.013	0.003	0.004
Other single-vehicle collision	0.241	0.010	0.162	0.039	0.049

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_i	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	0.158	1.000	0.000	--
Minor commercial	1	0.050	1.000	0.107	
Major industrial/institutional	1	0.172	1.000	0.367	
Minor industrial/institutional	0	0.023	1.000	0.000	
Major residential	0	0.083	1.000	0.000	
Minor residential	4	0.016	1.000	0.137	
Other	0	0.025	1.000	0.000	
Total	--	--	--	0.610	

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	0.610	1.000	0.610	1.11	1.00	0.679
Fatal and injury (FI)	--	0.323	0.197	1.11	1.00	0.219
Property damage only (PDO)	--	0.677	0.413	1.11	1.00	0.460

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr}	Calibration factor, C_r	Predicted N_{pedr}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	1.821	0.281	0.679	2.782	0.005	1.00	0.014
Fatal and injury (FI)	--	--	--	--	--	1.00	0.014

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker}	Calibration factor, C_r	Predicted N_{biker}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	1.821	0.281	0.679	2.782	0.004	1.00	0.011
Fatal and injury (FI)	--	--	--	--	--	1.00	0.011

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)	0.381	1.011	1.392
Head-on collisions (from Worksheet 1D)	0.036	0.005	0.041
Angle collisions (from Worksheet 1D)	0.044	0.103	0.147
Sideswipe, same direction (from Worksheet 1D)	0.008	0.040	0.048
Sideswipe, opposite direction (from Worksheet 1D)	0.038	0.071	0.110
Driveway-related collisions (from Worksheet 1H)	0.219	0.460	0.679
Other multiple-vehicle collision (from Worksheet 1D)	0.015	0.069	0.084
Subtotal	0.742	1.759	2.500
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.001	0.016	0.017
Collision with fixed object (from Worksheet 1F)	0.031	0.181	0.212
Collision with other object (from Worksheet 1F)	0.000	0.003	0.004
Other single-vehicle collision (from Worksheet 1F)	0.010	0.039	0.049
Collision with pedestrian (from Worksheet 1I)	0.014	0.000	0.014
Collision with bicycle (from Worksheet 1J)	0.011	0.000	0.011
Subtotal	0.068	0.238	0.306
Total	0.810	1.997	2.807

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Crash Severity Level	Predicted average crash frequency, $N_{\text{predicted}}$ (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)
	(Total) from Worksheet 1K		(2) / (3)
Total	2.8	0.18	15.6
Fatal and injury (FI)	0.8	0.18	4.5
Property damage only (PDO)	2.0	0.18	11.1

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections			
General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Intersection	at Old Willow
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)		--	3ST
AADT _{major} (veh/day)		--	32,000
AADT _{minor} (veh/day)		--	3,000
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	0
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]		--	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		--	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			1
Maximum number of lanes crossed by a pedestrian (n _{lanesx})		--	0
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
<i>CMF 1i</i>	<i>CMF 2i</i>	<i>CMF 3i</i>	<i>CMF 4i</i>	<i>CMF 5i</i>	<i>CMF 6i</i>	<i>CMF_{COMB}</i>
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	1.00	1.00	1.00

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 (7) from Worksheet 2B	Calibration Factor, C_i	Predicted N_{bimv}
	from Table 12-10			from Table 12-10	from Equation 12-21		(4) _{TOTAL} * (5)			(6) * (7) * (8)
	a	b	c							
Total	-13.36	1.11	0.41	0.80	4.209	1.000	4.209	1.00	1.00	4.209
Fatal and Injury (FI)	-14.01	1.16	0.30	0.69	1.530	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.326	1.372	1.00	1.00	1.372
Property Damage Only (PDO)	-15.38	1.20	0.51	0.77	3.163	$(5)_{TOTAL} - (5)_{FI}$ 0.674	2.837	1.00	1.00	2.837

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	1.372	1.000	2.837	4.209
		$(2) * (3)_{FI}$		$(4) * (5)_{PDO}$	$(3) + (5)$
Rear-end collision	0.421	0.578	0.440	1.248	1.826
Head-on collision	0.045	0.062	0.023	0.065	0.127
Angle collision	0.343	0.471	0.262	0.743	1.214
Sideswipe	0.126	0.173	0.040	0.113	0.286
Other multiple-vehicle collision	0.065	0.089	0.235	0.667	0.756

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_{bisv}	Combined CMFs (7) from Worksheet 2B	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)			(6) * (7) * (8)
	a	b	c							
Total	-6.81	0.16	0.51	1.14	0.344	1.000	0.344	1.00	1.00	0.344
Fatal and Injury (FI)	--	--	--	--	0.107	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.294	0.101	1.00	1.00	0.101
Property Damage Only (PDO)	-8.36	0.25	0.55	1.29	0.256	$(5)_{TOTAL} - (5)_{FI}$ 0.706	0.243	1.00	1.00	0.243

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	0.243	0.344
		(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	0.004	0.005
Collision with fixed object	0.762	0.077	0.834	0.203	0.280
Collision with other object	0.090	0.009	0.092	0.022	0.031
Other single-vehicle collision	0.039	0.004	0.023	0.006	0.010
Single-vehicle noncollision	0.105	0.011	0.030	0.007	0.018

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Calibration factor, C _i	Predicted N _{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	4.209	0.344	4.553	0.021	1.00	0.096
Fatal and injury (FI)	--	--	--	--	1.00	0.096

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									
	a	b	c	d	e					
Total	--	--	--	--	--	--	--	--	1.00	--
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	--

Worksheet 2J -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Intersections						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N_{bimv}	Predicted N_{bisv}	Predicted N_{bi}	f_{bikei}	Calibration factor, C_i	Predicted N_{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	4.209	0.344	4.553	0.016	1.00	0.073
Fatal and injury (FI)	--	--	--	--	1.00	0.073

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)	0.578	1.248	1.826
Head-on collisions (from Worksheet 2D)	0.062	0.065	0.127
Angle collisions (from Worksheet 2D)	0.471	0.743	1.214
Sideswipe (from Worksheet 2D)	0.173	0.113	0.286
Other multiple-vehicle collision (from Worksheet 2D)	0.089	0.667	0.756
Subtotal	1.372	2.837	4.209
SINGLE-VEHICLE			
Collision with parked vehicle (from Worksheet 2F)	0.000	0.001	0.001
Collision with animal (from Worksheet 2F)	0.000	0.004	0.005
Collision with fixed object (from Worksheet 2F)	0.077	0.203	0.280
Collision with other object (from Worksheet 2F)	0.009	0.022	0.031
Other single-vehicle collision (from Worksheet 2F)	0.004	0.006	0.010
Single-vehicle noncollision (from Worksheet 2F)	0.011	0.007	0.018
Collision with pedestrian (from Worksheet 2G or 2I)	0.096	0.000	0.096
Collision with bicycle (from Worksheet 2J)	0.073	0.000	0.073
Subtotal	0.270	0.243	0.513
Total	1.642	3.080	4.721

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	4.7
Fatal and injury (FI)	1.6
Property damage only (PDO)	3.1

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

General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Old Willow Rd. to Wagner
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	2U
Length of segment, L (mi)		--	0.42
AADT (veh/day)		--	30,000
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)		--	11
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	45
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	22
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	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								
	a	b	from Table 12-3	from Equation 12-10	(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(6)*(7)*(8)		
Total	-15.22	1.68	0.84	3.427	1.000	3.427	1.08	1.00	3.711
Fatal and Injury (FI)	-16.22	1.66	0.65	1.026	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.287	0.984	1.08	1.00	1.065
Property Damage Only (PDO)	-15.62	1.69	0.87	2.546	$(5)_{TOTAL} - (5)_{FI}$ 0.713	2.443	1.08	1.00	2.645

Worksheet 1D -- Multiple-Vehicle Nondrivable 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	1.065	1.000	2.645	3.711
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.730	0.778	0.778	2.058	2.836
Head-on collision	0.068	0.072	0.004	0.011	0.083
Angle collision	0.085	0.091	0.079	0.209	0.300
Sideswipe, same direction	0.015	0.016	0.031	0.082	0.098
Sideswipe, opposite direction	0.073	0.078	0.055	0.145	0.223
Other multiple-vehicle collision	0.029	0.031	0.053	0.140	0.171

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 (6) from Worksheet 1B	Calibration Factor, Cr	Predicted N _{brsv}
	from Table 12-5								
	a	b							
Total	-5.47	0.56	0.81	0.569	1.000	0.569	1.08	1.00	0.616
Fatal and Injury (FI)	-3.96	0.23	0.50	0.086	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.158	0.090	1.08	1.00	0.097
Property Damage Only (PDO)	-6.51	0.64	0.87	0.459	(5) _{TOTAL} -(5) _{FI} 0.842	0.479	1.08	1.00	0.519

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	0.097	1.000	0.519	0.616
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.026	0.003	0.066	0.034	0.037
Collision with fixed object	0.723	0.070	0.759	0.394	0.464
Collision with other object	0.010	0.001	0.013	0.007	0.008
Other single-vehicle collision	0.241	0.023	0.162	0.084	0.107

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_i	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	0.158	1.000	0.000	--
Minor commercial	0	0.050	1.000	0.000	
Major industrial/institutional	0	0.172	1.000	0.000	
Minor industrial/institutional	0	0.023	1.000	0.000	
Major residential	0	0.083	1.000	0.000	
Minor residential	11	0.016	1.000	0.352	
Other	0	0.025	1.000	0.000	
Total	--	--	--	0.352	

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	0.352	1.000	0.352	1.08	1.00	0.381
Fatal and injury (FI)	--	0.323	0.114	1.08	1.00	0.123
Property damage only (PDO)	--	0.677	0.238	1.08	1.00	0.258

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr}	Calibration factor, C_r	Predicted N_{pedr}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	3.711	0.616	0.381	4.708	0.005	1.00	0.024
Fatal and injury (FI)	--	--	--	--	--	1.00	0.024

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker}	Calibration factor, C_r	Predicted N_{biker}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	3.711	0.616	0.381	4.708	0.004	1.00	0.019
Fatal and injury (FI)	--	--	--	--	--	1.00	0.019

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)	0.778	2.058	2.836
Head-on collisions (from Worksheet 1D)	0.072	0.011	0.083
Angle collisions (from Worksheet 1D)	0.091	0.209	0.300
Sideswipe, same direction (from Worksheet 1D)	0.016	0.082	0.098
Sideswipe, opposite direction (from Worksheet 1D)	0.078	0.145	0.223
Driveway-related collisions (from Worksheet 1H)	0.123	0.258	0.381
Other multiple-vehicle collision (from Worksheet 1D)	0.031	0.140	0.171
Subtotal	1.189	2.903	4.092
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.003	0.034	0.037
Collision with fixed object (from Worksheet 1F)	0.070	0.394	0.464
Collision with other object (from Worksheet 1F)	0.001	0.007	0.008
Other single-vehicle collision (from Worksheet 1F)	0.023	0.084	0.107
Collision with pedestrian (from Worksheet 1I)	0.024	0.000	0.024
Collision with bicycle (from Worksheet 1J)	0.019	0.000	0.019
Subtotal	0.139	0.519	0.658
Total	1.328	3.422	4.750

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Crash Severity Level	Predicted average crash frequency, $N_{\text{predicted rs}}$ (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)
	(Total) from Worksheet 1K		(2) / (3)
Total	4.7	0.42	11.3
Fatal and injury (FI)	1.3	0.42	3.2
Property damage only (PDO)	3.4	0.42	8.1

Alternative 7
Lake Avenue Add Lanes – IL Route 43 to I-94
Safety Performance Calculations

Willow Road - Sunset Ridge Road to Wagner Road
 2040 Predicted Crash Frequency
 Alternative 7 (Lake Avenue Add Lanes - IL Route 43 to I-94)

	Predicted Crash Frequency (Crashes/Year)		
	Fatality-Injury	Property Damage Only	Total
Segment 1, Sunset Ridge to Old Willow	0.8	1.9	2.7
Intersection 1, Willow at Old Willow	1.6	3.0	4.6
Segment 2, Old Willow to Wagner	1.3	3.4	4.7
Total Crashes	3.7	8.3	12.0

Totals may not add due to rounding.

Worksheet 1A -- General Information and Input Data for Urban and Suburban Roadway Segments			
General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Sunset Ridge to Old Willow Rd
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data	Base Conditions	Site Conditions	
Roadway type (2U, 3T, 4U, 4D, ST)	--	2U	
Length of segment, L (mi)	--	0.18	
AADT (veh/day)	--	31,000	
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)	--	1	
Major industrial / institutional driveways (number)	--	1	
Minor industrial / institutional driveways (number)	--	0	
Major residential driveways (number)	--	0	
Minor residential driveways (number)	--	4	
Other driveways (number)	--	0	
Speed Category	--	Posted Speed Greater than 30 mph	
Roadside fixed object density (fixed objects / mi)	0	56	
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]	30	23	
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	1.11	1.00	1.00	1.00	1.11

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 Equation 12-10	(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(6)*(7)*(8)
	a	b											
Total	-15.22	1.68	0.84	1.552	1.000	1.552	1.11	1.00	1.727				
Fatal and Injury (FI)	-16.22	1.66	0.65	0.464	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.287	0.445	1.11	1.00	0.495				
Property Damage Only (PDO)	-15.62	1.69	0.87	1.153	$(5)_{TOTAL} - (5)_{FI}$ 0.713	1.106	1.11	1.00	1.231				

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	0.495	1.000	1.231	1.727
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.730	0.362	0.778	0.958	1.320
Head-on collision	0.068	0.034	0.004	0.005	0.039
Angle collision	0.085	0.042	0.079	0.097	0.139
Sideswipe, same direction	0.015	0.007	0.031	0.038	0.046
Sideswipe, opposite direction	0.073	0.036	0.055	0.068	0.104
Other multiple-vehicle collision	0.029	0.014	0.053	0.065	0.080

Worksheet 1E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
	SPF Coefficients		Overdispersion 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)
Total	a	b	0.81	0.248	1.000	0.248	1.11	1.00	0.276
Fatal and Injury (FI)	-5.47	0.56	0.50	0.037	(4) _{FI} /((4) _{FI} +(4) _{PDO})	0.039	1.11	1.00	0.043
	-3.96	0.23			0.156				
Property Damage Only (PDO)	-6.51	0.64	0.87	0.201	(5) _{TOTAL} -(5) _{FI}	0.210	1.11	1.00	0.233
					0.844				

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	0.043	1.000	0.233	0.276
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.026	0.001	0.066	0.015	0.017
Collision with fixed object	0.723	0.031	0.759	0.177	0.208
Collision with other object	0.010	0.000	0.013	0.003	0.003
Other single-vehicle collision	0.241	0.010	0.162	0.038	0.048

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_i from Table 12-7	Coefficient for traffic adjustment, t from Table 12-7	Initial N_{brdwy}	Overdispersion parameter, k from Table 12-7	
				Equation 12-16 $n_j * N_j * (AADT/15,000)^t$		
Major commercial	0	0.158	1.000	0.000	--	
Minor commercial	1	0.050	1.000	0.103		
Major industrial/institutional	1	0.172	1.000	0.355		
Minor industrial/institutional	0	0.023	1.000	0.000		
Major residential	0	0.083	1.000	0.000		
Minor residential	4	0.016	1.000	0.132		
Other	0	0.025	1.000	0.000		
Total	--	--	--	0.591		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}) from Table 12-7	Adjusted N_{brdwy} (2) _{TOTAL} * (3)	Combined CMFs (6) from Worksheet 1B	Calibration factor, C_r	Predicted N_{brdwy} (4)*(5)*(6)
	(5) _{TOTAL} from Worksheet 1G					
Total	0.591	1.000	0.591	1.11	1.00	0.658
Fatal and injury (FI)	--	0.323	0.191	1.11	1.00	0.212
Property damage only (PDO)	--	0.677	0.400	1.11	1.00	0.445

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr} from Table 12-8	Calibration factor, C_r	Predicted N_{pedr} (5)*(6)*(7)
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			
Total	1.727	0.276	0.658	2.661	0.005	1.00	0.013
Fatal and injury (FI)	--	--	--	--	--	1.00	0.013

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker} from Table 12-9	Calibration factor, C_r	Predicted N_{biker} (5)*(6)*(7)
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			
Total	1.727	0.276	0.658	2.661	0.004	1.00	0.011
Fatal and injury (FI)	--	--	--	--	--	1.00	0.011

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)	0.362	0.958	1.320
Head-on collisions (from Worksheet 1D)	0.034	0.005	0.039
Angle collisions (from Worksheet 1D)	0.042	0.097	0.139
Sideswipe, same direction (from Worksheet 1D)	0.007	0.038	0.046
Sideswipe, opposite direction (from Worksheet 1D)	0.036	0.068	0.104
Driveway-related collisions (from Worksheet 1H)	0.212	0.445	0.658
Other multiple-vehicle collision (from Worksheet 1D)	0.014	0.065	0.080
Subtotal	0.708	1.677	2.385
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.001	0.015	0.017
Collision with fixed object (from Worksheet 1F)	0.031	0.177	0.208
Collision with other object (from Worksheet 1F)	0.000	0.003	0.003
Other single-vehicle collision (from Worksheet 1F)	0.010	0.038	0.048
Collision with pedestrian (from Worksheet 1I)	0.013	0.000	0.013
Collision with bicycle (from Worksheet 1J)	0.011	0.000	0.011
Subtotal	0.067	0.233	0.300
Total	0.775	1.910	2.685

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	2.7	0.18	14.9
Fatal and injury (FI)	0.8	0.18	4.3
Property damage only (PDO)	1.9	0.18	10.6

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections

General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Intersection	at Old Willow
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)		--	3ST
AADT _{major} (veh/day)		--	31,000
AADT _{minor} (veh/day)		--	3,000
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	0
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]		--	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		--	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			1
Maximum number of lanes crossed by a pedestrian (n _{lanes})		--	0
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
<i>CMF_{1i}</i>	<i>CMF_{2i}</i>	<i>CMF_{3i}</i>	<i>CMF_{4i}</i>	<i>CMF_{5i}</i>	<i>CMF_{6i}</i>	<i>CMF_{COMB}</i>
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	1.00	1.00	1.00

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 from Table 12-10	Initial N _{bimv} from Equation 12-21	Proportion of Total Crashes	Adjusted N _{bimv} (4) _{TOTAL} *(5)	Combined CMFs (7) from Worksheet 2B	Calibration Factor, C _i	Predicted N _{bimv} (6)*(7)*(8)
	from Table 12-10									
	a	b	c							
Total	-13.36	1.11	0.41	0.80	4.063	1.000	4.063	1.00	1.00	4.063
Fatal and Injury (FI)	-14.01	1.16	0.30	0.69	1.475	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.326	1.326	1.00	1.00	1.326
Property Damage Only (PDO)	-15.38	1.20	0.51	0.77	3.045	$(5)_{TOTAL} - (5)_{FI}$ 0.674	2.737	1.00	1.00	2.737

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	1.326	1.000	2.737	4.063
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.421	0.558	0.440	1.204	1.763
Head-on collision	0.045	0.060	0.023	0.063	0.123
Angle collision	0.343	0.455	0.262	0.717	1.172
Sideswipe	0.126	0.167	0.040	0.109	0.277
Other multiple-vehicle collision	0.065	0.086	0.235	0.643	0.729

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 from Table 12-12	Initial N _{bisv} from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27	Proportion of Total Crashes	Adjusted N _{bimv} (4) _{TOTAL} *(5)	Combined CMFs (7) from Worksheet 2B	Calibration Factor, C _i	Predicted N _{bisv} (6)*(7)*(8)
	from Table 12-12									
	a	b	c							
Total	-6.81	0.16	0.51	1.14	0.342	1.000	0.342	1.00	1.00	0.342
Fatal and Injury (FI)	--	--	--	--	0.106	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.295	0.101	1.00	1.00	0.101
Property Damage Only (PDO)	-8.36	0.25	0.55	1.29	0.254	$(5)_{TOTAL} - (5)_{FI}$ 0.705	0.241	1.00	1.00	0.241

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	0.241	0.342
		(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	0.004	0.005
Collision with fixed object	0.762	0.077	0.834	0.201	0.278
Collision with other object	0.090	0.009	0.092	0.022	0.031
Other single-vehicle collision	0.039	0.004	0.023	0.006	0.009
Single-vehicle noncollision	0.105	0.011	0.030	0.007	0.018

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Calibration factor, C _i	Predicted N _{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	4.063	0.342	4.405	0.021	1.00	0.093
Fatal and injury (FI)	--	--	--	--	1.00	0.093

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									
	a	b	c	d	e					
Total	--	--	--	--	--	--	--	--	1.00	--
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	--

Worksheet 2J -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N_{bimv}	Predicted N_{bisv}	Predicted N_{bi}	f_{bikei}	Calibration factor, C_i	Predicted N_{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	4.063	0.342	4.405	0.016	1.00	0.070
Fatal and injury (FI)	--	--	--	--	1.00	0.070

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)	0.558	1.204	1.763
Head-on collisions (from Worksheet 2D)	0.060	0.063	0.123
Angle collisions (from Worksheet 2D)	0.455	0.717	1.172
Sideswipe (from Worksheet 2D)	0.167	0.109	0.277
Other multiple-vehicle collision (from Worksheet 2D)	0.086	0.643	0.729
Subtotal	1.326	2.737	4.063
SINGLE-VEHICLE			
Collision with parked vehicle (from Worksheet 2F)	0.000	0.001	0.001
Collision with animal (from Worksheet 2F)	0.000	0.004	0.005
Collision with fixed object (from Worksheet 2F)	0.077	0.201	0.278
Collision with other object (from Worksheet 2F)	0.009	0.022	0.031
Other single-vehicle collision (from Worksheet 2F)	0.004	0.006	0.009
Single-vehicle noncollision (from Worksheet 2F)	0.011	0.007	0.018
Collision with pedestrian (from Worksheet 2G or 2I)	0.093	0.000	0.093
Collision with bicycle (from Worksheet 2J)	0.070	0.000	0.070
Subtotal	0.264	0.241	0.505
Total	1.590	2.979	4.568

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	4.6
Fatal and injury (FI)	1.6
Property damage only (PDO)	3.0

Worksheet 1A -- General Information and Input Data for Urban and Suburban Roadway Segments			
General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Old Willow Rd. to Wagner
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	2U
Length of segment, L (mi)		--	0.42
AADT (veh/day)		--	30,000
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)		--	11
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	45
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	22
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	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 Equation 12-10	(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(6)*(7)*(8)
	a	b											
Total	-15.22	1.68	0.84	3.427	1.000	3.427	1.08	1.00	3.711				
Fatal and Injury (FI)	-16.22	1.66	0.65	1.026	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.287	0.984	1.08	1.00	1.065				
Property Damage Only (PDO)	-15.62	1.69	0.87	2.546	$(5)_{TOTAL} - (5)_{FI}$ 0.713	2.443	1.08	1.00	2.645				

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	1.065	1.000	2.645	3.711
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.730	0.778	0.778	2.058	2.836
Head-on collision	0.068	0.072	0.004	0.011	0.083
Angle collision	0.085	0.091	0.079	0.209	0.300
Sideswipe, same direction	0.015	0.016	0.031	0.082	0.098
Sideswipe, opposite direction	0.073	0.078	0.055	0.145	0.223
Other multiple-vehicle collision	0.029	0.031	0.053	0.140	0.171

Worksheet 1E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
	SPF Coefficients		Overdispersion 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)
Total	a	b	0.81	0.569	1.000	0.569	1.08	1.00	0.616
Fatal and Injury (FI)	-5.47	0.56	0.50	0.086	(4) _{FI} /((4) _{FI} +(4) _{PDO})	0.090	1.08	1.00	0.097
	-3.96	0.23			0.158				
Property Damage Only (PDO)	-6.51	0.64	0.87	0.459	(5) _{TOTAL} -(5) _{FI}	0.479	1.08	1.00	0.519
					0.842				

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	0.097	1.000	0.519	0.616
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.026	0.003	0.066	0.034	0.037
Collision with fixed object	0.723	0.070	0.759	0.394	0.464
Collision with other object	0.010	0.001	0.013	0.007	0.008
Other single-vehicle collision	0.241	0.023	0.162	0.084	0.107

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_i from Table 12-7	Coefficient for traffic adjustment, t from Table 12-7	Initial N_{brdwy}	Overdispersion parameter, k from Table 12-7	
				Equation 12-16 $n_j * N_j * (AADT/15,000)^t$		
Major commercial	0	0.158	1.000	0.000	--	
Minor commercial	0	0.050	1.000	0.000		
Major industrial/institutional	0	0.172	1.000	0.000		
Minor industrial/institutional	0	0.023	1.000	0.000		
Major residential	0	0.083	1.000	0.000		
Minor residential	11	0.016	1.000	0.352		
Other	0	0.025	1.000	0.000		
Total	--	--	--	0.352		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}) from Table 12-7	Adjusted N_{brdwy} (2) _{TOTAL} * (3)	Combined CMFs (6) from Worksheet 1B	Calibration factor, C_r	Predicted N_{brdwy} (4)*(5)*(6)
	(5) _{TOTAL} from Worksheet 1G					
Total	0.352	1.000	0.352	1.08	1.00	0.381
Fatal and injury (FI)	--	0.323	0.114	1.08	1.00	0.123
Property damage only (PDO)	--	0.677	0.238	1.08	1.00	0.258

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr} from Table 12-8	Calibration factor, C_r	Predicted N_{pedr} (5)*(6)*(7)
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			
Total	3.711	0.616	0.381	4.708	0.005	1.00	0.024
Fatal and injury (FI)	--	--	--	--	--	1.00	0.024

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker} from Table 12-9	Calibration factor, C_r	Predicted N_{biker} (5)*(6)*(7)
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			
Total	3.711	0.616	0.381	4.708	0.004	1.00	0.019
Fatal and injury (FI)	--	--	--	--	--	1.00	0.019

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)	0.778	2.058	2.836
Head-on collisions (from Worksheet 1D)	0.072	0.011	0.083
Angle collisions (from Worksheet 1D)	0.091	0.209	0.300
Sideswipe, same direction (from Worksheet 1D)	0.016	0.082	0.098
Sideswipe, opposite direction (from Worksheet 1D)	0.078	0.145	0.223
Driveway-related collisions (from Worksheet 1H)	0.123	0.258	0.381
Other multiple-vehicle collision (from Worksheet 1D)	0.031	0.140	0.171
Subtotal	1.189	2.903	4.092
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.003	0.034	0.037
Collision with fixed object (from Worksheet 1F)	0.070	0.394	0.464
Collision with other object (from Worksheet 1F)	0.001	0.007	0.008
Other single-vehicle collision (from Worksheet 1F)	0.023	0.084	0.107
Collision with pedestrian (from Worksheet 1I)	0.024	0.000	0.024
Collision with bicycle (from Worksheet 1J)	0.019	0.000	0.019
Subtotal	0.139	0.519	0.658
Total	1.328	3.422	4.750

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	0.42	11.3
Fatal and injury (FI)	1.3	0.42	3.2
Property damage only (PDO)	3.4	0.42	8.1

Alternative 8
Full Interchange I-294 at Lake Avenue
Safety Performance Calculations

Willow Road - Sunset Ridge Road to Wagner Road
 2040 Predicted Crash Frequency
 Alternative 8 (Full Interchange I-294 at Lake Avenue)

	Predicted Crash Frequency (Crashes/Year)		
	Fatality-Injury	Property Damage Only	Total
Segment 1, Sunset Ridge to Old Willow	0.8	2.1	2.9
Intersection 1, Willow at Old Willow	1.7	3.2	4.9
Segment 2, Old Willow to Wagner	1.4	3.6	5.0
Total Crashes	3.9	8.9	12.7

Totals may not add due to rounding.

Worksheet 1A -- General Information and Input Data for Urban and Suburban Roadway Segments			
General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Sunset Ridge to Old Willow Rd
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data	Base Conditions	Site Conditions	
Roadway type (2U, 3T, 4U, 4D, ST)	--	2U	
Length of segment, L (mi)	--	0.18	
AADT (veh/day)	--	33,000	
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)	--	1	
Major industrial / institutional driveways (number)	--	1	
Minor industrial / institutional driveways (number)	--	0	
Major residential driveways (number)	--	0	
Minor residential driveways (number)	--	4	
Other driveways (number)	--	0	
Speed Category	--	Posted Speed Greater than 30 mph	
Roadside fixed object density (fixed objects / mi)	0	56	
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]	30	23	
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	1.11	1.00	1.00	1.00	1.11

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	-15.22	1.68	0.84	1.724	1.000	1.724	1.11	1.00	1.918					
Fatal and Injury (FI)	-16.22	1.66	0.65	0.515	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.287	0.494	1.11	1.00	0.550					
Property Damage Only (PDO)	-15.62	1.69	0.87	1.282	$(5)_{TOTAL} - (5)_{FI}$ 0.713	1.230	1.11	1.00	1.368					

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	0.550	1.000	1.368	1.918
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.730	0.401	0.778	1.065	1.466
Head-on collision	0.068	0.037	0.004	0.005	0.043
Angle collision	0.085	0.047	0.079	0.108	0.155
Sideswipe, same direction	0.015	0.008	0.031	0.042	0.051
Sideswipe, opposite direction	0.073	0.040	0.055	0.075	0.115
Other multiple-vehicle collision	0.029	0.016	0.053	0.073	0.088

Worksheet 1E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
	SPF Coefficients		Overdispersion 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)
Total	a	b	0.81	0.257	1.000	0.257	1.11	1.00	0.286
Fatal and Injury (FI)	-3.96	0.23	0.50	0.038	(4) _{FI} /((4) _{FI} +(4) _{PDO})	0.039	1.11	1.00	0.044
Property Damage Only (PDO)	-6.51	0.64	0.87	0.209	(5) _{TOTAL} -(5) _{FI}	0.218	1.11	1.00	0.242
					0.848				

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	0.044	1.000	0.242	0.286
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.026	0.001	0.066	0.016	0.017
Collision with fixed object	0.723	0.032	0.759	0.184	0.216
Collision with other object	0.010	0.000	0.013	0.003	0.004
Other single-vehicle collision	0.241	0.011	0.162	0.039	0.050

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_i from Table 12-7	Coefficient for traffic adjustment, t from Table 12-7	Initial N_{brdwy}	Overdispersion parameter, k from Table 12-7	
				Equation 12-16 $n_j * N_j * (AADT/15,000)^t$		
Major commercial	0	0.158	1.000	0.000	--	
Minor commercial	1	0.050	1.000	0.110		
Major industrial/institutional	1	0.172	1.000	0.378		
Minor industrial/institutional	0	0.023	1.000	0.000		
Major residential	0	0.083	1.000	0.000		
Minor residential	4	0.016	1.000	0.141		
Other	0	0.025	1.000	0.000		
Total	--	--	--	0.629		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}) from Table 12-7	Adjusted N_{brdwy} (2) _{TOTAL} * (3)	Combined CMFs (6) from Worksheet 1B	Calibration factor, C_r	Predicted N_{brdwy} (4)*(5)*(6)
	(5) _{TOTAL} from Worksheet 1G					
Total	0.629	1.000	0.629	1.11	1.00	0.700
Fatal and injury (FI)	--	0.323	0.203	1.11	1.00	0.226
Property damage only (PDO)	--	0.677	0.426	1.11	1.00	0.474

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr} from Table 12-8	Calibration factor, C_r	Predicted N_{pedr} (5)*(6)*(7)
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			
Total	1.918	0.286	0.700	2.904	0.005	1.00	0.015
Fatal and injury (FI)	--	--	--	--	--	1.00	0.015

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker} from Table 12-9	Calibration factor, C_r	Predicted N_{biker} (5)*(6)*(7)
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			
Total	1.918	0.286	0.700	2.904	0.004	1.00	0.012
Fatal and injury (FI)	--	--	--	--	--	1.00	0.012

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)	0.401	1.065	1.466
Head-on collisions (from Worksheet 1D)	0.037	0.005	0.043
Angle collisions (from Worksheet 1D)	0.047	0.108	0.155
Sideswipe, same direction (from Worksheet 1D)	0.008	0.042	0.051
Sideswipe, opposite direction (from Worksheet 1D)	0.040	0.075	0.115
Driveway-related collisions (from Worksheet 1H)	0.226	0.474	0.700
Other multiple-vehicle collision (from Worksheet 1D)	0.016	0.073	0.088
Subtotal	0.776	1.842	2.618
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.001	0.016	0.017
Collision with fixed object (from Worksheet 1F)	0.032	0.184	0.216
Collision with other object (from Worksheet 1F)	0.000	0.003	0.004
Other single-vehicle collision (from Worksheet 1F)	0.011	0.039	0.050
Collision with pedestrian (from Worksheet 1I)	0.015	0.000	0.015
Collision with bicycle (from Worksheet 1J)	0.012	0.000	0.012
Subtotal	0.070	0.242	0.312
Total	0.846	2.085	2.930

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	2.9	0.18	16.3
Fatal and injury (FI)	0.8	0.18	4.7
Property damage only (PDO)	2.1	0.18	11.6

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections			
General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Intersection	at Old Willow
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)		--	3ST
AADT _{major} (veh/day)		--	33,000
AADT _{minor} (veh/day)		--	3,000
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	0
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]		--	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		--	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			1
Maximum number of lanes crossed by a pedestrian (n _{lanesx})		--	0
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
<i>CMF 1i</i>	<i>CMF 2i</i>	<i>CMF 3i</i>	<i>CMF 4i</i>	<i>CMF 5i</i>	<i>CMF 6i</i>	<i>CMF_{COMB}</i>
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	1.00	1.00	1.00

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	4.355	1.000	4.355	1.00	1.00	4.355
Fatal and Injury (FI)	-14.01	1.16	0.30	0.69	1.585	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.326	1.419	1.00	1.00	1.419
Property Damage Only (PDO)	-15.38	1.20	0.51	0.77	3.282	$(5)_{TOTAL}-(5)_{FI}$ 0.674	2.936	1.00	1.00	2.936

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	1.419	1.000	2.936	4.355
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.421	0.597	0.440	1.292	1.889
Head-on collision	0.045	0.064	0.023	0.068	0.131
Angle collision	0.343	0.487	0.262	0.769	1.256
Sideswipe	0.126	0.179	0.040	0.117	0.296
Other multiple-vehicle collision	0.065	0.092	0.235	0.690	0.782

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	0.346	1.000	0.346	1.00	1.00	0.346
Fatal and Injury (FI)	--	--	--	--	0.107	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.294	0.102	1.00	1.00	0.102
Property Damage Only (PDO)	-8.36	0.25	0.55	1.29	0.258	$(5)_{TOTAL}-(5)_{FI}$ 0.706	0.244	1.00	1.00	0.244

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	0.102	1.000	0.244	0.346
		(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	0.004	0.005
Collision with fixed object	0.762	0.077	0.834	0.204	0.281
Collision with other object	0.090	0.009	0.092	0.022	0.032
Other single-vehicle collision	0.039	0.004	0.023	0.006	0.010
Single-vehicle noncollision	0.105	0.011	0.030	0.007	0.018

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Calibration factor, C _i	Predicted N _{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	4.355	0.346	4.701	0.021	1.00	0.099
Fatal and injury (FI)	--	--	--	--	1.00	0.099

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} from Equation 12-29	Combined CMF (4) from Worksheet 2H	Calibration factor, C _i	Predicted N _{pedi}
	from Table 12-14									(4)*(5)*(6)
	a	b	c	d	e					
Total	--	--	--	--	--	--	--	--	1.00	--
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	--

Worksheet 2J -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Intersections						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N_{bimv}	Predicted N_{bisv}	Predicted N_{bi}	f_{bikei}	Calibration factor, C_i	Predicted N_{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	4.355	0.346	4.701	0.016	1.00	0.075
Fatal and injury (FI)	--	--	--	--	1.00	0.075

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)	0.597	1.292	1.889
Head-on collisions (from Worksheet 2D)	0.064	0.068	0.131
Angle collisions (from Worksheet 2D)	0.487	0.769	1.256
Sideswipe (from Worksheet 2D)	0.179	0.117	0.296
Other multiple-vehicle collision (from Worksheet 2D)	0.092	0.690	0.782
Subtotal	1.419	2.936	4.355
SINGLE-VEHICLE			
Collision with parked vehicle (from Worksheet 2F)	0.000	0.001	0.001
Collision with animal (from Worksheet 2F)	0.000	0.004	0.005
Collision with fixed object (from Worksheet 2F)	0.077	0.204	0.281
Collision with other object (from Worksheet 2F)	0.009	0.022	0.032
Other single-vehicle collision (from Worksheet 2F)	0.004	0.006	0.010
Single-vehicle noncollision (from Worksheet 2F)	0.011	0.007	0.018
Collision with pedestrian (from Worksheet 2G or 2I)	0.099	0.000	0.099
Collision with bicycle (from Worksheet 2J)	0.075	0.000	0.075
Subtotal	0.275	0.244	0.520
Total	1.694	3.181	4.875

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	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Old Willow Rd. to Wagner
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data	Base Conditions	Site Conditions	
Roadway type (2U, 3T, 4U, 4D, ST)	--	2U	
Length of segment, L (mi)	--	0.42	
AADT (veh/day)	--	31,000	
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)	--	11	
Other driveways (number)	--	0	
Speed Category	--	Posted Speed Greater than 30 mph	
Roadside fixed object density (fixed objects / mi)	0	45	
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]	30	22	
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	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 Equation 12-10	(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(6)*(7)*(8)
	a	b											
Total	-15.22	1.68	0.84	3.621	1.000	3.621	1.08	1.00	3.921				
Fatal and Injury (FI)	-16.22	1.66	0.65	1.083	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.287	1.039	1.08	1.00	1.125				
Property Damage Only (PDO)	-15.62	1.69	0.87	2.691	$(5)_{TOTAL} - (5)_{FI}$ 0.713	2.582	1.08	1.00	2.796				

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	1.125	1.000	2.796	3.921
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.730	0.821	0.778	2.175	2.996
Head-on collision	0.068	0.077	0.004	0.011	0.088
Angle collision	0.085	0.096	0.079	0.221	0.316
Sideswipe, same direction	0.015	0.017	0.031	0.087	0.104
Sideswipe, opposite direction	0.073	0.082	0.055	0.154	0.236
Other multiple-vehicle collision	0.029	0.033	0.053	0.148	0.181

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}
	a	b	from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)	(6) from Worksheet 1B		(6)*(7)*(8)
Total	-5.47	0.56	0.81	0.579	1.000	0.579	1.08	1.00	0.627
Fatal and Injury (FI)	-3.96	0.23	0.50	0.086	(4) _{FI} /((4) _{FI} +(4) _{PDO})	0.090	1.08	1.00	0.098
Property Damage Only (PDO)	-6.51	0.64	0.87	0.468	(5) _{TOTAL} -(5) _{FI}	0.489	1.08	1.00	0.530
					0.844				

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	0.098	1.000	0.530	0.627
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.026	0.003	0.066	0.035	0.037
Collision with fixed object	0.723	0.071	0.759	0.402	0.473
Collision with other object	0.010	0.001	0.013	0.007	0.008
Other single-vehicle collision	0.241	0.024	0.162	0.086	0.109

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_i from Table 12-7	Coefficient for traffic adjustment, t from Table 12-7	Initial N_{brdwy}	Overdispersion parameter, k from Table 12-7	
				Equation 12-16 $n_j * N_j * (AADT/15,000)^t$		
Major commercial	0	0.158	1.000	0.000	--	
Minor commercial	0	0.050	1.000	0.000		
Major industrial/institutional	0	0.172	1.000	0.000		
Minor industrial/institutional	0	0.023	1.000	0.000		
Major residential	0	0.083	1.000	0.000		
Minor residential	11	0.016	1.000	0.364		
Other	0	0.025	1.000	0.000		
Total	--	--	--	0.364		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}) from Table 12-7	Adjusted N_{brdwy} (2) _{TOTAL} * (3)	Combined CMFs (6) from Worksheet 1B	Calibration factor, C_r	Predicted N_{brdwy} (4)*(5)*(6)
	(5) _{TOTAL} from Worksheet 1G					
Total	0.364	1.000	0.364	1.08	1.00	0.394
Fatal and injury (FI)	--	0.323	0.117	1.08	1.00	0.127
Property damage only (PDO)	--	0.677	0.246	1.08	1.00	0.267

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr} from Table 12-8	Calibration factor, C_r	Predicted N_{pedr} (5)*(6)*(7)
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			
Total	3.921	0.627	0.394	4.942	0.005	1.00	0.025
Fatal and injury (FI)	--	--	--	--	--	1.00	0.025

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker} from Table 12-9	Calibration factor, C_r	Predicted N_{biker} (5)*(6)*(7)
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			
Total	3.921	0.627	0.394	4.942	0.004	1.00	0.020
Fatal and injury (FI)	--	--	--	--	--	1.00	0.020

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)	0.821	2.175	2.996
Head-on collisions (from Worksheet 1D)	0.077	0.011	0.088
Angle collisions (from Worksheet 1D)	0.096	0.221	0.316
Sideswipe, same direction (from Worksheet 1D)	0.017	0.087	0.104
Sideswipe, opposite direction (from Worksheet 1D)	0.082	0.154	0.236
Driveway-related collisions (from Worksheet 1H)	0.127	0.267	0.394
Other multiple-vehicle collision (from Worksheet 1D)	0.033	0.148	0.181
Subtotal	1.252	3.062	4.315
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.003	0.035	0.037
Collision with fixed object (from Worksheet 1F)	0.071	0.402	0.473
Collision with other object (from Worksheet 1F)	0.001	0.007	0.008
Other single-vehicle collision (from Worksheet 1F)	0.024	0.086	0.109
Collision with pedestrian (from Worksheet 1I)	0.025	0.000	0.025
Collision with bicycle (from Worksheet 1J)	0.020	0.000	0.020
Subtotal	0.142	0.530	0.672
Total	1.394	3.592	4.986

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	5.0	0.42	11.9
Fatal and injury (FI)	1.4	0.42	3.3
Property damage only (PDO)	3.6	0.42	8.6

Alternative 9
Full Interchange I-294 at Dundee Road
Safety Performance Calculations

Willow Road - Sunset Ridge Road to Wagner Road
 2040 Predicted Crash Frequency
 Alternative 9 (Full Interchange I-294 at Dundee Road)

	Predicted Crash Frequency (Crashes/Year)		
	Fatality-Injury	Property Damage Only	Total
Segment 1, Sunset Ridge to Old Willow	0.8	2.0	2.8
Intersection 1, Willow at Old Willow	1.6	3.1	4.7
Segment 2, Old Willow to Wagner	1.3	3.4	4.7
Total Crashes	3.8	8.5	12.2

Totals may not add due to rounding.

Worksheet 1A -- General Information and Input Data for Urban and Suburban Roadway Segments			
General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Sunset Ridge to Old Willow Rd
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	2U
Length of segment, L (mi)		--	0.18
AADT (veh/day)		--	32,000
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)		--	1
Major industrial / institutional driveways (number)		--	1
Minor industrial / institutional driveways (number)		--	0
Major residential driveways (number)		--	0
Minor residential driveways (number)		--	4
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	56
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	23
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	1.11	1.00	1.00	1.00	1.11

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	-15.22	1.68	0.84	1.637	1.000	1.637	1.11	1.00	1.821					
Fatal and Injury (FI)	-16.22	1.66	0.65	0.489	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.287	0.469	1.11	1.00	0.522					
Property Damage Only (PDO)	-15.62	1.69	0.87	1.217	$(5)_{TOTAL} - (5)_{FI}$ 0.713	1.167	1.11	1.00	1.299					

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	0.522	1.000	1.299	1.821
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.730	0.381	0.778	1.011	1.392
Head-on collision	0.068	0.036	0.004	0.005	0.041
Angle collision	0.085	0.044	0.079	0.103	0.147
Sideswipe, same direction	0.015	0.008	0.031	0.040	0.048
Sideswipe, opposite direction	0.073	0.038	0.055	0.071	0.110
Other multiple-vehicle collision	0.029	0.015	0.053	0.069	0.084

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
	a	b							
Total	-5.47	0.56	0.81	0.253	1.000	0.253	1.11	1.00	0.281
Fatal and Injury (FI)	-3.96	0.23	0.50	0.037	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.154	0.039	1.11	1.00	0.043
Property Damage Only (PDO)	-6.51	0.64	0.87	0.205	(5) _{TOTAL} -(5) _{FI} 0.846	0.214	1.11	1.00	0.238

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	0.043	1.000	0.238	0.281
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.026	0.001	0.066	0.016	0.017
Collision with fixed object	0.723	0.031	0.759	0.181	0.212
Collision with other object	0.010	0.000	0.013	0.003	0.004
Other single-vehicle collision	0.241	0.010	0.162	0.039	0.049

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_i from Table 12-7	Coefficient for traffic adjustment, t from Table 12-7	Initial N_{brdwy}	Overdispersion parameter, k from Table 12-7	
				Equation 12-16 $n_j * N_j * (AADT/15,000)^t$		
Major commercial	0	0.158	1.000	0.000	--	
Minor commercial	1	0.050	1.000	0.107		
Major industrial/institutional	1	0.172	1.000	0.367		
Minor industrial/institutional	0	0.023	1.000	0.000		
Major residential	0	0.083	1.000	0.000		
Minor residential	4	0.016	1.000	0.137		
Other	0	0.025	1.000	0.000		
Total	--	--	--	0.610		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}) from Table 12-7	Adjusted N_{brdwy} (2) _{TOTAL} * (3)	Combined CMFs (6) from Worksheet 1B	Calibration factor, C_r	Predicted N_{brdwy} (4)*(5)*(6)
	(5) _{TOTAL} from Worksheet 1G					
Total	0.610	1.000	0.610	1.11	1.00	0.679
Fatal and injury (FI)	--	0.323	0.197	1.11	1.00	0.219
Property damage only (PDO)	--	0.677	0.413	1.11	1.00	0.460

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr} from Table 12-8	Calibration factor, C_r	Predicted N_{pedr} (5)*(6)*(7)
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			
Total	1.821	0.281	0.679	2.782	0.005	1.00	0.014
Fatal and injury (FI)	--	--	--	--	--	1.00	0.014

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker} from Table 12-9	Calibration factor, C_r	Predicted N_{biker} (5)*(6)*(7)
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			
Total	1.821	0.281	0.679	2.782	0.004	1.00	0.011
Fatal and injury (FI)	--	--	--	--	--	1.00	0.011

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)	0.381	1.011	1.392
Head-on collisions (from Worksheet 1D)	0.036	0.005	0.041
Angle collisions (from Worksheet 1D)	0.044	0.103	0.147
Sideswipe, same direction (from Worksheet 1D)	0.008	0.040	0.048
Sideswipe, opposite direction (from Worksheet 1D)	0.038	0.071	0.110
Driveway-related collisions (from Worksheet 1H)	0.219	0.460	0.679
Other multiple-vehicle collision (from Worksheet 1D)	0.015	0.069	0.084
Subtotal	0.742	1.759	2.500
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.001	0.016	0.017
Collision with fixed object (from Worksheet 1F)	0.031	0.181	0.212
Collision with other object (from Worksheet 1F)	0.000	0.003	0.004
Other single-vehicle collision (from Worksheet 1F)	0.010	0.039	0.049
Collision with pedestrian (from Worksheet 1I)	0.014	0.000	0.014
Collision with bicycle (from Worksheet 1J)	0.011	0.000	0.011
Subtotal	0.068	0.238	0.306
Total	0.810	1.997	2.807

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	2.8	0.18	15.6
Fatal and injury (FI)	0.8	0.18	4.5
Property damage only (PDO)	2.0	0.18	11.1

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections

General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Intersection	at Old Willow
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)		--	3ST
AADT _{major} (veh/day)		--	32,000
AADT _{minor} (veh/day)		--	3,000
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	0
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]		--	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		--	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			1
Maximum number of lanes crossed by a pedestrian (n _{lanes})		--	0
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
<i>CMF_{1i}</i>	<i>CMF_{2i}</i>	<i>CMF_{3i}</i>	<i>CMF_{4i}</i>	<i>CMF_{5i}</i>	<i>CMF_{6i}</i>	<i>CMF_{COMB}</i>
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	1.00	1.00	1.00

Worksheet 2C -- Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1) Crash Severity Level	(2) SPF Coefficients			(3) Overdispersion Parameter, k	(4) Initial N _{bimv}	(5) Proportion of Total Crashes	(6) Adjusted N _{bimv}	(7) Combined CMFs	(8) Calibration Factor, C _i	(9) Predicted N _{bimv}				
	from Table 12-10										(4) _{FI} /((4) _{FI} + (4) _{PDO})	(4) _{TOTAL} * (5)	(7) from Worksheet 2B	(6)*(7)*(8)
	a	b	c											
Total	-13.36	1.11	0.41	0.80	4.209	1.000	4.209	1.00	1.00	4.209				
Fatal and Injury (FI)	-14.01	1.16	0.30	0.69	1.530	0.326	1.372	1.00	1.00	1.372				
Property Damage Only (PDO)	-15.38	1.20	0.51	0.77	3.163	0.674	2.837	1.00	1.00	2.837				

Worksheet 2D -- Multiple-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1) Collision Type	(2) Proportion of Collision Type _(FI)	(3) Predicted N _{bimv (FI)} (crashes/year)	(4) Proportion of Collision Type _(PDO)	(5) Predicted N _{bimv (PDO)} (crashes/year)	(6) 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
						(2)*(3) _{FI}	(4)*(5) _{PDO}	(3)+(5)		
Total	1.000	1.372	1.000	2.837	4.209					
Rear-end collision	0.421	0.578	0.440	1.248	1.826					
Head-on collision	0.045	0.062	0.023	0.065	0.127					
Angle collision	0.343	0.471	0.262	0.743	1.214					
Sideswipe	0.126	0.173	0.040	0.113	0.286					
Other multiple-vehicle collision	0.065	0.089	0.235	0.667	0.756					

Worksheet 2E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1) Crash Severity Level	(2) SPF Coefficients			(3) Overdispersion Parameter, k	(4) Initial N _{bisv}	(5) Proportion of Total Crashes	(6) Adjusted N _{bimv}	(7) Combined CMFs	(8) Calibration Factor, C _i	(9) Predicted N _{bisv}				
	from Table 12-12										(4) _{FI} /((4) _{FI} + (4) _{PDO})	(4) _{TOTAL} * (5)	(7) from Worksheet 2B	(6)*(7)*(8)
	a	b	c											
Total	-6.81	0.16	0.51	1.14	0.344	1.000	0.344	1.00	1.00	0.344				
Fatal and Injury (FI)	--	--	--	--	0.107	0.294	0.101	1.00	1.00	0.101				
Property Damage Only (PDO)	-8.36	0.25	0.55	1.29	0.256	0.706	0.243	1.00	1.00	0.243				

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 (2)*(3) _{FI}	1.000	0.243 (4)*(5) _{PDO}	0.344 (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	0.004	0.005
Collision with fixed object	0.762	0.077	0.834	0.203	0.280
Collision with other object	0.090	0.009	0.092	0.022	0.031
Other single-vehicle collision	0.039	0.004	0.023	0.006	0.010
Single-vehicle noncollision	0.105	0.011	0.030	0.007	0.018

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Calibration factor, C _i	Predicted N _{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	4.209	0.344	4.553	0.021	1.00	0.096
Fatal and injury (FI)	--	--	--	--	1.00	0.096

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
	a	b	c	d	e					
Total	--	--	--	--	--	--	--	--	1.00	--
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	--

Worksheet 2J -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N_{bimv}	Predicted N_{bisv}	Predicted N_{bi}	f_{bikei}	Calibration factor, C_i	Predicted N_{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	4.209	0.344	4.553	0.016	1.00	0.073
Fatal and injury (FI)	--	--	--	--	1.00	0.073

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)	0.578	1.248	1.826
Head-on collisions (from Worksheet 2D)	0.062	0.065	0.127
Angle collisions (from Worksheet 2D)	0.471	0.743	1.214
Sideswipe (from Worksheet 2D)	0.173	0.113	0.286
Other multiple-vehicle collision (from Worksheet 2D)	0.089	0.667	0.756
Subtotal	1.372	2.837	4.209
SINGLE-VEHICLE			
Collision with parked vehicle (from Worksheet 2F)	0.000	0.001	0.001
Collision with animal (from Worksheet 2F)	0.000	0.004	0.005
Collision with fixed object (from Worksheet 2F)	0.077	0.203	0.280
Collision with other object (from Worksheet 2F)	0.009	0.022	0.031
Other single-vehicle collision (from Worksheet 2F)	0.004	0.006	0.010
Single-vehicle noncollision (from Worksheet 2F)	0.011	0.007	0.018
Collision with pedestrian (from Worksheet 2G or 2I)	0.096	0.000	0.096
Collision with bicycle (from Worksheet 2J)	0.073	0.000	0.073
Subtotal	0.270	0.243	0.513
Total	1.642	3.080	4.721

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	4.7
Fatal and injury (FI)	1.6
Property damage only (PDO)	3.1

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

General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Old Willow Rd. to Wagner
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	2U
Length of segment, L (mi)		--	0.42
AADT (veh/day)		--	30,000
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)		--	11
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	45
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	22
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	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								
	a	b	from Table 12-3	from Equation 12-10		(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(6)*(7)*(8)	
Total	-15.22	1.68	0.84	3.427	1.000	3.427	1.08	1.00	3.711
Fatal and Injury (FI)	-16.22	1.66	0.65	1.026	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.287	0.984	1.08	1.00	1.065
Property Damage Only (PDO)	-15.62	1.69	0.87	2.546	$(5)_{TOTAL} - (5)_{FI}$ 0.713	2.443	1.08	1.00	2.645

Worksheet 1D -- Multiple-Vehicle Nondrivable 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	1.065	1.000	2.645	3.711
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.730	0.778	0.778	2.058	2.836
Head-on collision	0.068	0.072	0.004	0.011	0.083
Angle collision	0.085	0.091	0.079	0.209	0.300
Sideswipe, same direction	0.015	0.016	0.031	0.082	0.098
Sideswipe, opposite direction	0.073	0.078	0.055	0.145	0.223
Other multiple-vehicle collision	0.029	0.031	0.053	0.140	0.171

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 (6) from Worksheet 1B	Calibration Factor, Cr	Predicted N _{brsv}
	from Table 12-5								
	a	b							
Total	-5.47	0.56	0.81	0.569	1.000	0.569	1.08	1.00	0.616
Fatal and Injury (FI)	-3.96	0.23	0.50	0.086	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.158	0.090	1.08	1.00	0.097
Property Damage Only (PDO)	-6.51	0.64	0.87	0.459	(5) _{TOTAL} -(5) _{FI} 0.842	0.479	1.08	1.00	0.519

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	0.097	1.000	0.519	0.616
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.026	0.003	0.066	0.034	0.037
Collision with fixed object	0.723	0.070	0.759	0.394	0.464
Collision with other object	0.010	0.001	0.013	0.007	0.008
Other single-vehicle collision	0.241	0.023	0.162	0.084	0.107

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_i	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	0.158	1.000	0.000	--
Minor commercial	0	0.050	1.000	0.000	
Major industrial/institutional	0	0.172	1.000	0.000	
Minor industrial/institutional	0	0.023	1.000	0.000	
Major residential	0	0.083	1.000	0.000	
Minor residential	11	0.016	1.000	0.352	
Other	0	0.025	1.000	0.000	
Total	--	--	--	0.352	

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	0.352	1.000	0.352	1.08	1.00	0.381
Fatal and injury (FI)	--	0.323	0.114	1.08	1.00	0.123
Property damage only (PDO)	--	0.677	0.238	1.08	1.00	0.258

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr}	Calibration factor, C_r	Predicted N_{pedr}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	3.711	0.616	0.381	4.708	0.005	1.00	0.024
Fatal and injury (FI)	--	--	--	--	--	1.00	0.024

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker}	Calibration factor, C_r	Predicted N_{biker}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	3.711	0.616	0.381	4.708	0.004	1.00	0.019
Fatal and injury (FI)	--	--	--	--	--	1.00	0.019

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 1D and 1F; (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)	0.778	2.058	2.836
Head-on collisions (from Worksheet 1D)	0.072	0.011	0.083
Angle collisions (from Worksheet 1D)	0.091	0.209	0.300
Sideswipe, same direction (from Worksheet 1D)	0.016	0.082	0.098
Sideswipe, opposite direction (from Worksheet 1D)	0.078	0.145	0.223
Driveway-related collisions (from Worksheet 1H)	0.123	0.258	0.381
Other multiple-vehicle collision (from Worksheet 1D)	0.031	0.140	0.171
Subtotal	1.189	2.903	4.092
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.003	0.034	0.037
Collision with fixed object (from Worksheet 1F)	0.070	0.394	0.464
Collision with other object (from Worksheet 1F)	0.001	0.007	0.008
Other single-vehicle collision (from Worksheet 1F)	0.023	0.084	0.107
Collision with pedestrian (from Worksheet 1I)	0.024	0.000	0.024
Collision with bicycle (from Worksheet 1J)	0.019	0.000	0.019
Subtotal	0.139	0.519	0.658
Total	1.328	3.422	4.750

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)
Crash Severity Level	Predicted average crash frequency, $N_{\text{predicted rs}}$ (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)
	(Total) from Worksheet 1K		(2) / (3)
Total	4.7	0.42	11.3
Fatal and injury (FI)	1.3	0.42	3.2
Property damage only (PDO)	3.4	0.42	8.1

Alternative 10
Full Interchange I-94 (Edens Spur) and I-294
Safety Performance Calculations

Willow Road - Sunset Ridge Road to Wagner Road
 2040 Predicted Crash Frequency
 Alternative 10 (Full Interchange I-94 (Edens Spur) and I-294)

	Predicted Crash Frequency (Crashes/Year)		
	Fatality-Injury	Property Damage Only	Total
Segment 1, Sunset Ridge to Old Willow	0.8	2.1	2.9
Intersection 1, Willow at Old Willow	1.7	3.2	4.9
Segment 2, Old Willow to Wagner	1.4	3.6	5.0
Total Crashes	3.9	8.9	12.7

Totals may not add due to rounding.

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

General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Sunset Ridge to Old Willow Rd
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	2U
Length of segment, L (mi)		--	0.18
AADT (veh/day)		--	33,000
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)		--	1
Major industrial / institutional driveways (number)		--	1
Minor industrial / institutional driveways (number)		--	0
Major residential driveways (number)		--	0
Minor residential driveways (number)		--	4
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	56
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	23
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	1.11	1.00	1.00	1.00	1.11

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	-15.22	1.68	0.84	1.724	1.000	1.724	1.11	1.00	1.918					
Fatal and Injury (FI)	-16.22	1.66	0.65	0.515	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.287	0.494	1.11	1.00	0.550					
Property Damage Only (PDO)	-15.62	1.69	0.87	1.282	$(5)_{TOTAL} - (5)_{FI}$ 0.713	1.230	1.11	1.00	1.368					

Worksheet 1D -- Multiple-Vehicle Nondrivable 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	0.550	1.000	1.368	1.918
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.730	0.401	0.778	1.065	1.466
Head-on collision	0.068	0.037	0.004	0.005	0.043
Angle collision	0.085	0.047	0.079	0.108	0.155
Sideswipe, same direction	0.015	0.008	0.031	0.042	0.051
Sideswipe, opposite direction	0.073	0.040	0.055	0.075	0.115
Other multiple-vehicle collision	0.029	0.016	0.053	0.073	0.088

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 (6) from Worksheet 1B	Calibration Factor, Cr	Predicted N _{brsv}
	from Table 12-5								
	a	b							
Total	-5.47	0.56	0.81	0.257	1.000	0.257	1.11	1.00	0.286
Fatal and Injury (FI)	-3.96	0.23	0.50	0.038	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.152	0.039	1.11	1.00	0.044
Property Damage Only (PDO)	-6.51	0.64	0.87	0.209	(5) _{TOTAL} -(5) _{FI} 0.848	0.218	1.11	1.00	0.242

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	0.044	1.000	0.242	0.286
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.026	0.001	0.066	0.016	0.017
Collision with fixed object	0.723	0.032	0.759	0.184	0.216
Collision with other object	0.010	0.000	0.013	0.003	0.004
Other single-vehicle collision	0.241	0.011	0.162	0.039	0.050

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_i	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	0.158	1.000	0.000	--
Minor commercial	1	0.050	1.000	0.110	
Major industrial/institutional	1	0.172	1.000	0.378	
Minor industrial/institutional	0	0.023	1.000	0.000	
Major residential	0	0.083	1.000	0.000	
Minor residential	4	0.016	1.000	0.141	
Other	0	0.025	1.000	0.000	
Total	--	--	--	0.629	

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	0.629	1.000	0.629	1.11	1.00	0.700
Fatal and injury (FI)	--	0.323	0.203	1.11	1.00	0.226
Property damage only (PDO)	--	0.677	0.426	1.11	1.00	0.474

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr}	Calibration factor, C_r	Predicted N_{pedr}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	1.918	0.286	0.700	2.904	0.005	1.00	0.015
Fatal and injury (FI)	--	--	--	--	--	1.00	0.015

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker}	Calibration factor, C_r	Predicted N_{biker}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	1.918	0.286	0.700	2.904	0.004	1.00	0.012
Fatal and injury (FI)	--	--	--	--	--	1.00	0.012

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 1D and 1F; (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)	0.401	1.065	1.466
Head-on collisions (from Worksheet 1D)	0.037	0.005	0.043
Angle collisions (from Worksheet 1D)	0.047	0.108	0.155
Sideswipe, same direction (from Worksheet 1D)	0.008	0.042	0.051
Sideswipe, opposite direction (from Worksheet 1D)	0.040	0.075	0.115
Driveway-related collisions (from Worksheet 1H)	0.226	0.474	0.700
Other multiple-vehicle collision (from Worksheet 1D)	0.016	0.073	0.088
Subtotal	0.776	1.842	2.618
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.001	0.016	0.017
Collision with fixed object (from Worksheet 1F)	0.032	0.184	0.216
Collision with other object (from Worksheet 1F)	0.000	0.003	0.004
Other single-vehicle collision (from Worksheet 1F)	0.011	0.039	0.050
Collision with pedestrian (from Worksheet 1I)	0.015	0.000	0.015
Collision with bicycle (from Worksheet 1J)	0.012	0.000	0.012
Subtotal	0.070	0.242	0.312
Total	0.846	2.085	2.930

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)
Crash Severity Level	Predicted average crash frequency, $N_{\text{predicted}}$ (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)
	(Total) from Worksheet 1K		(2) / (3)
Total	2.9	0.18	16.3
Fatal and injury (FI)	0.8	0.18	4.7
Property damage only (PDO)	2.1	0.18	11.6

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections			
General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Intersection	at Old Willow
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)		--	3ST
AADT _{major} (veh/day)		--	33,000
AADT _{minor} (veh/day)		--	3,000
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	0
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]		--	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		--	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			1
Maximum number of lanes crossed by a pedestrian (n _{lanesx})		--	0
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
<i>CMF 1i</i>	<i>CMF 2i</i>	<i>CMF 3i</i>	<i>CMF 4i</i>	<i>CMF 5i</i>	<i>CMF 6i</i>	<i>CMF_{COMB}</i>
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	1.00	1.00	1.00

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	4.355	1.000	4.355	1.00	1.00	4.355
Fatal and Injury (FI)	-14.01	1.16	0.30	0.69	1.585	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.326	1.419	1.00	1.00	1.419
Property Damage Only (PDO)	-15.38	1.20	0.51	0.77	3.282	$(5)_{TOTAL} - (5)_{FI}$ 0.674	2.936	1.00	1.00	2.936

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	1.419	1.000	2.936	4.355
		$(2) * (3)_{FI}$		$(4) * (5)_{PDO}$	$(3) + (5)$
Rear-end collision	0.421	0.597	0.440	1.292	1.889
Head-on collision	0.045	0.064	0.023	0.068	0.131
Angle collision	0.343	0.487	0.262	0.769	1.256
Sideswipe	0.126	0.179	0.040	0.117	0.296
Other multiple-vehicle collision	0.065	0.092	0.235	0.690	0.782

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_{bisv}	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	0.346	1.000	0.346	1.00	1.00	0.346
Fatal and Injury (FI)	--	--	--	--	0.107	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.294	0.102	1.00	1.00	0.102
Property Damage Only (PDO)	-8.36	0.25	0.55	1.29	0.258	$(5)_{TOTAL} - (5)_{FI}$ 0.706	0.244	1.00	1.00	0.244

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	0.102	1.000	0.244	0.346
		(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	0.004	0.005
Collision with fixed object	0.762	0.077	0.834	0.204	0.281
Collision with other object	0.090	0.009	0.092	0.022	0.032
Other single-vehicle collision	0.039	0.004	0.023	0.006	0.010
Single-vehicle noncollision	0.105	0.011	0.030	0.007	0.018

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Calibration factor, C _i	Predicted N _{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	4.355	0.346	4.701	0.021	1.00	0.099
Fatal and injury (FI)	--	--	--	--	1.00	0.099

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} from Equation 12-29	Combined CMF (4) from Worksheet 2H	Calibration factor, C _i	Predicted N _{pedi} (4)*(5)*(6)
	from Table 12-14									
	a	b	c	d	e					
Total	--	--	--	--	--	--	--	--	1.00	--
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	--

Worksheet 2J -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Intersections						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N_{bimv}	Predicted N_{bisv}	Predicted N_{bi}	f_{bikei}	Calibration factor, C_i	Predicted N_{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	4.355	0.346	4.701	0.016	1.00	0.075
Fatal and injury (FI)	--	--	--	--	1.00	0.075

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)	0.597	1.292	1.889
Head-on collisions (from Worksheet 2D)	0.064	0.068	0.131
Angle collisions (from Worksheet 2D)	0.487	0.769	1.256
Sideswipe (from Worksheet 2D)	0.179	0.117	0.296
Other multiple-vehicle collision (from Worksheet 2D)	0.092	0.690	0.782
Subtotal	1.419	2.936	4.355
SINGLE-VEHICLE			
Collision with parked vehicle (from Worksheet 2F)	0.000	0.001	0.001
Collision with animal (from Worksheet 2F)	0.000	0.004	0.005
Collision with fixed object (from Worksheet 2F)	0.077	0.204	0.281
Collision with other object (from Worksheet 2F)	0.009	0.022	0.032
Other single-vehicle collision (from Worksheet 2F)	0.004	0.006	0.010
Single-vehicle noncollision (from Worksheet 2F)	0.011	0.007	0.018
Collision with pedestrian (from Worksheet 2G or 2I)	0.099	0.000	0.099
Collision with bicycle (from Worksheet 2J)	0.075	0.000	0.075
Subtotal	0.275	0.244	0.520
Total	1.694	3.181	4.875

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	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Old Willow Rd. to Wagner
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data	Base Conditions	Site Conditions	
Roadway type (2U, 3T, 4U, 4D, ST)	--	2U	
Length of segment, L (mi)	--	0.42	
AADT (veh/day)	--	31,000	
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)	--	11	
Other driveways (number)	--	0	
Speed Category	--	Posted Speed Greater than 30 mph	
Roadside fixed object density (fixed objects / mi)	0	45	
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]	30	22	
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	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 Equation 12-10	(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(6)*(7)*(8)
	a	b											
Total	-15.22	1.68	0.84	3.621	1.000	3.621	1.08	1.00	3.921				
Fatal and Injury (FI)	-16.22	1.66	0.65	1.083	$\frac{(4)_{FI}}{((4)_{FI}+(4)_{PDO})}$ 0.287	1.039	1.08	1.00	1.125				
Property Damage Only (PDO)	-15.62	1.69	0.87	2.691	$\frac{(5)_{TOTAL}-(5)_{FI}}{0.713}$	2.582	1.08	1.00	2.796				

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	1.125	1.000	2.796	3.921
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.730	0.821	0.778	2.175	2.996
Head-on collision	0.068	0.077	0.004	0.011	0.088
Angle collision	0.085	0.096	0.079	0.221	0.316
Sideswipe, same direction	0.015	0.017	0.031	0.087	0.104
Sideswipe, opposite direction	0.073	0.082	0.055	0.154	0.236
Other multiple-vehicle collision	0.029	0.033	0.053	0.148	0.181

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}
	a	b	from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)	(6) from Worksheet 1B		(6)*(7)*(8)
Total	-5.47	0.56	0.81	0.579	1.000	0.579	1.08	1.00	0.627
Fatal and Injury (FI)	-3.96	0.23	0.50	0.086	(4) _{FI} /((4) _{FI} +(4) _{PDO})	0.090	1.08	1.00	0.098
Property Damage Only (PDO)	-6.51	0.64	0.87	0.468	(5) _{TOTAL} -(5) _{FI}	0.489	1.08	1.00	0.530
					0.844				

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	0.098	1.000	0.530	0.627
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.026	0.003	0.066	0.035	0.037
Collision with fixed object	0.723	0.071	0.759	0.402	0.473
Collision with other object	0.010	0.001	0.013	0.007	0.008
Other single-vehicle collision	0.241	0.024	0.162	0.086	0.109

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_i from Table 12-7	Coefficient for traffic adjustment, t from Table 12-7	Initial N_{brdwy}	Overdispersion parameter, k from Table 12-7	
				Equation 12-16 $n_j * N_j * (AADT/15,000)^t$		
Major commercial	0	0.158	1.000	0.000	--	
Minor commercial	0	0.050	1.000	0.000		
Major industrial/institutional	0	0.172	1.000	0.000		
Minor industrial/institutional	0	0.023	1.000	0.000		
Major residential	0	0.083	1.000	0.000		
Minor residential	11	0.016	1.000	0.364		
Other	0	0.025	1.000	0.000		
Total	--	--	--	0.364		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	0.364	1.000	0.364	1.08	1.00	0.394
Fatal and injury (FI)	--	0.323	0.117	1.08	1.00	0.127
Property damage only (PDO)	--	0.677	0.246	1.08	1.00	0.267

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr}	Calibration factor, C_r	Predicted N_{pedr}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	3.921	0.627	0.394	4.942	0.005	1.00	0.025
Fatal and injury (FI)	--	--	--	--	--	1.00	0.025

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker}	Calibration factor, C_r	Predicted N_{biker}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	3.921	0.627	0.394	4.942	0.004	1.00	0.020
Fatal and injury (FI)	--	--	--	--	--	1.00	0.020

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)	0.821	2.175	2.996
Head-on collisions (from Worksheet 1D)	0.077	0.011	0.088
Angle collisions (from Worksheet 1D)	0.096	0.221	0.316
Sideswipe, same direction (from Worksheet 1D)	0.017	0.087	0.104
Sideswipe, opposite direction (from Worksheet 1D)	0.082	0.154	0.236
Driveway-related collisions (from Worksheet 1H)	0.127	0.267	0.394
Other multiple-vehicle collision (from Worksheet 1D)	0.033	0.148	0.181
Subtotal	1.252	3.062	4.315
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.003	0.035	0.037
Collision with fixed object (from Worksheet 1F)	0.071	0.402	0.473
Collision with other object (from Worksheet 1F)	0.001	0.007	0.008
Other single-vehicle collision (from Worksheet 1F)	0.024	0.086	0.109
Collision with pedestrian (from Worksheet 1I)	0.025	0.000	0.025
Collision with bicycle (from Worksheet 1J)	0.020	0.000	0.020
Subtotal	0.142	0.530	0.672
Total	1.394	3.592	4.986

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Crash Severity Level	Predicted average crash frequency, $N_{\text{predicted rs}}$ (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)
	(Total) from Worksheet 1K		(2) / (3)
Total	5.0	0.42	11.9
Fatal and injury (FI)	1.4	0.42	3.3
Property damage only (PDO)	3.6	0.42	8.6

Alternative 11
Full Interchange I-94 (Edens Spur) at IL Route 43
Safety Performance Calculations

Willow Road - Sunset Ridge Road to Wagner Road
 2040 Predicted Crash Frequency
 Alternative 11 (Full Interchange I-94 (Edens Spur) at IL Route 43)

	Predicted Crash Frequency (Crashes/Year)		
	Fatality-Injury	Property Damage Only	Total
Segment 1, Sunset Ridge to Old Willow	0.8	2.0	2.8
Intersection 1, Willow at Old Willow	1.6	3.1	4.7
Segment 2, Old Willow to Wagner	1.3	3.4	4.7
Total Crashes	3.8	8.5	12.2

Totals may not add due to rounding.

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

General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Sunset Ridge to Old Willow Rd
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	2U
Length of segment, L (mi)		--	0.18
AADT (veh/day)		--	32,000
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)		--	1
Major industrial / institutional driveways (number)		--	1
Minor industrial / institutional driveways (number)		--	0
Major residential driveways (number)		--	0
Minor residential driveways (number)		--	4
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	56
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	23
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	1.11	1.00	1.00	1.00	1.11

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								
	a	b	from Table 12-3	from Equation 12-10	(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(6)*(7)*(8)		
Total	-15.22	1.68	0.84	1.637	1.000	1.637	1.11	1.00	1.821
Fatal and Injury (FI)	-16.22	1.66	0.65	0.489	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.287	0.469	1.11	1.00	0.522
Property Damage Only (PDO)	-15.62	1.69	0.87	1.217	$(5)_{TOTAL} - (5)_{FI}$ 0.713	1.167	1.11	1.00	1.299

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		0.522	1.000	1.299	1.821
			(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.730		0.381	0.778	1.011	1.392
Head-on collision	0.068		0.036	0.004	0.005	0.041
Angle collision	0.085		0.044	0.079	0.103	0.147
Sideswipe, same direction	0.015		0.008	0.031	0.040	0.048
Sideswipe, opposite direction	0.073		0.038	0.055	0.071	0.110
Other multiple-vehicle collision	0.029		0.015	0.053	0.069	0.084

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 (6) from Worksheet 1B	Calibration Factor, Cr	Predicted N _{brsv}
	from Table 12-5		from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)			(6)*(7)*(8)
	a	b							
Total	-5.47	0.56	0.81	0.253	1.000	0.253	1.11	1.00	0.281
Fatal and Injury (FI)	-3.96	0.23	0.50	0.037	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.154	0.039	1.11	1.00	0.043
Property Damage Only (PDO)	-6.51	0.64	0.87	0.205	(5) _{TOTAL} -(5) _{FI} 0.846	0.214	1.11	1.00	0.238

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	0.043	1.000	0.238	0.281
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.026	0.001	0.066	0.016	0.017
Collision with fixed object	0.723	0.031	0.759	0.181	0.212
Collision with other object	0.010	0.000	0.013	0.003	0.004
Other single-vehicle collision	0.241	0.010	0.162	0.039	0.049

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_i	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	0.158	1.000	0.000	--
Minor commercial	1	0.050	1.000	0.107	
Major industrial/institutional	1	0.172	1.000	0.367	
Minor industrial/institutional	0	0.023	1.000	0.000	
Major residential	0	0.083	1.000	0.000	
Minor residential	4	0.016	1.000	0.137	
Other	0	0.025	1.000	0.000	
Total	--	--	--	0.610	

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	0.610	1.000	0.610	1.11	1.00	0.679
Fatal and injury (FI)	--	0.323	0.197	1.11	1.00	0.219
Property damage only (PDO)	--	0.677	0.413	1.11	1.00	0.460

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr}	Calibration factor, C_r	Predicted N_{pedr}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	1.821	0.281	0.679	2.782	0.005	1.00	0.014
Fatal and injury (FI)	--	--	--	--	--	1.00	0.014

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker}	Calibration factor, C_r	Predicted N_{biker}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	1.821	0.281	0.679	2.782	0.004	1.00	0.011
Fatal and injury (FI)	--	--	--	--	--	1.00	0.011

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)	0.381	1.011	1.392
Head-on collisions (from Worksheet 1D)	0.036	0.005	0.041
Angle collisions (from Worksheet 1D)	0.044	0.103	0.147
Sideswipe, same direction (from Worksheet 1D)	0.008	0.040	0.048
Sideswipe, opposite direction (from Worksheet 1D)	0.038	0.071	0.110
Driveway-related collisions (from Worksheet 1H)	0.219	0.460	0.679
Other multiple-vehicle collision (from Worksheet 1D)	0.015	0.069	0.084
Subtotal	0.742	1.759	2.500
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.001	0.016	0.017
Collision with fixed object (from Worksheet 1F)	0.031	0.181	0.212
Collision with other object (from Worksheet 1F)	0.000	0.003	0.004
Other single-vehicle collision (from Worksheet 1F)	0.010	0.039	0.049
Collision with pedestrian (from Worksheet 1I)	0.014	0.000	0.014
Collision with bicycle (from Worksheet 1J)	0.011	0.000	0.011
Subtotal	0.068	0.238	0.306
Total	0.810	1.997	2.807

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Crash Severity Level	Predicted average crash frequency, $N_{\text{predicted}}$ (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)
	(Total) from Worksheet 1K		(2) / (3)
Total	2.8	0.18	15.6
Fatal and injury (FI)	0.8	0.18	4.5
Property damage only (PDO)	2.0	0.18	11.1

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections

General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Intersection	at Old Willow
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)		--	3ST
AADT _{major} (veh/day)		--	32,000
AADT _{minor} (veh/day)		--	3,000
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	0
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]		--	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		--	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			1
Maximum number of lanes crossed by a pedestrian (n _{lanes})		--	0
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
<i>CMF_{1i}</i>	<i>CMF_{2i}</i>	<i>CMF_{3i}</i>	<i>CMF_{4i}</i>	<i>CMF_{5i}</i>	<i>CMF_{6i}</i>	<i>CMF_{COMB}</i>
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	1.00	1.00	1.00

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 from Table 12-10	Initial N _{bimv} from Equation 12-21	Proportion of Total Crashes	Adjusted N _{bimv} (4) _{TOTAL} *(5)	Combined CMFs (7) from Worksheet 2B	Calibration Factor, C _i	Predicted N _{bimv} (6)*(7)*(8)
	from Table 12-10									
	a	b	c							
Total	-13.36	1.11	0.41	0.80	4.209	1.000	4.209	1.00	1.00	4.209
Fatal and Injury (FI)	-14.01	1.16	0.30	0.69	1.530	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.326	1.372	1.00	1.00	1.372
Property Damage Only (PDO)	-15.38	1.20	0.51	0.77	3.163	(5) _{TOTAL} -(5) _{FI} 0.674	2.837	1.00	1.00	2.837

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	1.372	1.000	2.837	4.209
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.421	0.578	0.440	1.248	1.826
Head-on collision	0.045	0.062	0.023	0.065	0.127
Angle collision	0.343	0.471	0.262	0.743	1.214
Sideswipe	0.126	0.173	0.040	0.113	0.286
Other multiple-vehicle collision	0.065	0.089	0.235	0.667	0.756

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 from Table 12-12	Initial N _{bisv} from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27	Proportion of Total Crashes	Adjusted N _{bimv} (4) _{TOTAL} *(5)	Combined CMFs (7) from Worksheet 2B	Calibration Factor, C _i	Predicted N _{bisv} (6)*(7)*(8)
	from Table 12-12									
	a	b	c							
Total	-6.81	0.16	0.51	1.14	0.344	1.000	0.344	1.00	1.00	0.344
Fatal and Injury (FI)	--	--	--	--	0.107	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.294	0.101	1.00	1.00	0.101
Property Damage Only (PDO)	-8.36	0.25	0.55	1.29	0.256	(5) _{TOTAL} -(5) _{FI} 0.706	0.243	1.00	1.00	0.243

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 (2)*(3) _{FI}	1.000	0.243 (4)*(5) _{PDO}	0.344 (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	0.004	0.005
Collision with fixed object	0.762	0.077	0.834	0.203	0.280
Collision with other object	0.090	0.009	0.092	0.022	0.031
Other single-vehicle collision	0.039	0.004	0.023	0.006	0.010
Single-vehicle noncollision	0.105	0.011	0.030	0.007	0.018

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Calibration factor, C _i	Predicted N _{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	4.209	0.344	4.553	0.021	1.00	0.096
Fatal and injury (FI)	--	--	--	--	1.00	0.096

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
	a	b	c	d	e					
Total	--	--	--	--	--	--	--	--	1.00	--
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	--

Worksheet 2J -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N_{bimv}	Predicted N_{bisv}	Predicted N_{bi}	f_{bikei}	Calibration factor, C_i	Predicted N_{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	4.209	0.344	4.553	0.016	1.00	0.073
Fatal and injury (FI)	--	--	--	--	1.00	0.073

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)	0.578	1.248	1.826
Head-on collisions (from Worksheet 2D)	0.062	0.065	0.127
Angle collisions (from Worksheet 2D)	0.471	0.743	1.214
Sideswipe (from Worksheet 2D)	0.173	0.113	0.286
Other multiple-vehicle collision (from Worksheet 2D)	0.089	0.667	0.756
Subtotal	1.372	2.837	4.209
SINGLE-VEHICLE			
Collision with parked vehicle (from Worksheet 2F)	0.000	0.001	0.001
Collision with animal (from Worksheet 2F)	0.000	0.004	0.005
Collision with fixed object (from Worksheet 2F)	0.077	0.203	0.280
Collision with other object (from Worksheet 2F)	0.009	0.022	0.031
Other single-vehicle collision (from Worksheet 2F)	0.004	0.006	0.010
Single-vehicle noncollision (from Worksheet 2F)	0.011	0.007	0.018
Collision with pedestrian (from Worksheet 2G or 2I)	0.096	0.000	0.096
Collision with bicycle (from Worksheet 2J)	0.073	0.000	0.073
Subtotal	0.270	0.243	0.513
Total	1.642	3.080	4.721

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	4.7
Fatal and injury (FI)	1.6
Property damage only (PDO)	3.1

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

General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Old Willow Rd. to Wagner
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data	Base Conditions	Site Conditions	
Roadway type (2U, 3T, 4U, 4D, ST)	--	2U	
Length of segment, L (mi)	--	0.42	
AADT (veh/day)	--	30,000	
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)	--	11	
Other driveways (number)	--	0	
Speed Category	--	Posted Speed Greater than 30 mph	
Roadside fixed object density (fixed objects / mi)	0	45	
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]	30	22	
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	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 Equation 12-10	(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(6)*(7)*(8)
	a	b											
Total	-15.22	1.68	0.84	3.427	1.000	3.427	1.08	1.00	3.711				
Fatal and Injury (FI)	-16.22	1.66	0.65	1.026	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.287	0.984	1.08	1.00	1.065				
Property Damage Only (PDO)	-15.62	1.69	0.87	2.546	$(5)_{TOTAL} - (5)_{FI}$ 0.713	2.443	1.08	1.00	2.645				

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	1.065	1.000	2.645	3.711
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.730	0.778	0.778	2.058	2.836
Head-on collision	0.068	0.072	0.004	0.011	0.083
Angle collision	0.085	0.091	0.079	0.209	0.300
Sideswipe, same direction	0.015	0.016	0.031	0.082	0.098
Sideswipe, opposite direction	0.073	0.078	0.055	0.145	0.223
Other multiple-vehicle collision	0.029	0.031	0.053	0.140	0.171

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 a	b	from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)	(6) from Worksheet 1B		(6)*(7)*(8)
Total	-5.47	0.56	0.81	0.569	1.000	0.569	1.08	1.00	0.616
Fatal and Injury (FI)	-3.96	0.23	0.50	0.086	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.158	0.090	1.08	1.00	0.097
Property Damage Only (PDO)	-6.51	0.64	0.87	0.459	(5) _{TOTAL} -(5) _{FI} 0.842	0.479	1.08	1.00	0.519

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	0.097	1.000	0.519	0.616
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.026	0.003	0.066	0.034	0.037
Collision with fixed object	0.723	0.070	0.759	0.394	0.464
Collision with other object	0.010	0.001	0.013	0.007	0.008
Other single-vehicle collision	0.241	0.023	0.162	0.084	0.107

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_i	Coefficient for traffic adjustment, t	Initial N_{brdwy}	Overdispersion parameter, k	
		from Table 12-7	from Table 12-7	Equation 12-16 $n_j * N_j * (AADT/15,000)^t$		
Major commercial	0	0.158	1.000	0.000	--	
Minor commercial	0	0.050	1.000	0.000		
Major industrial/institutional	0	0.172	1.000	0.000		
Minor industrial/institutional	0	0.023	1.000	0.000		
Major residential	0	0.083	1.000	0.000		
Minor residential	11	0.016	1.000	0.352		
Other	0	0.025	1.000	0.000		
Total	--	--	--	0.352		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	0.352	1.000	0.352	1.08	1.00	0.381
Fatal and injury (FI)	--	0.323	0.114	1.08	1.00	0.123
Property damage only (PDO)	--	0.677	0.238	1.08	1.00	0.258

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr}	Calibration factor, C_r	Predicted N_{pedr}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	3.711	0.616	0.381	4.708	0.005	1.00	0.024
Fatal and injury (FI)	--	--	--	--	--	1.00	0.024

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker}	Calibration factor, C_r	Predicted N_{biker}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	3.711	0.616	0.381	4.708	0.004	1.00	0.019
Fatal and injury (FI)	--	--	--	--	--	1.00	0.019

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)	0.778	2.058	2.836
Head-on collisions (from Worksheet 1D)	0.072	0.011	0.083
Angle collisions (from Worksheet 1D)	0.091	0.209	0.300
Sideswipe, same direction (from Worksheet 1D)	0.016	0.082	0.098
Sideswipe, opposite direction (from Worksheet 1D)	0.078	0.145	0.223
Driveway-related collisions (from Worksheet 1H)	0.123	0.258	0.381
Other multiple-vehicle collision (from Worksheet 1D)	0.031	0.140	0.171
Subtotal	1.189	2.903	4.092
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.003	0.034	0.037
Collision with fixed object (from Worksheet 1F)	0.070	0.394	0.464
Collision with other object (from Worksheet 1F)	0.001	0.007	0.008
Other single-vehicle collision (from Worksheet 1F)	0.023	0.084	0.107
Collision with pedestrian (from Worksheet 1I)	0.024	0.000	0.024
Collision with bicycle (from Worksheet 1J)	0.019	0.000	0.019
Subtotal	0.139	0.519	0.658
Total	1.328	3.422	4.750

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	0.42	11.3
Fatal and injury (FI)	1.3	0.42	3.2
Property damage only (PDO)	3.4	0.42	8.1

Alternative 12
Eliminate Eastbound Lane Drop on Edens Spur
Safety Performance Calculations

Willow Road - Sunset Ridge Road to Wagner Road
 2040 Predicted Crash Frequency
 Alternative 12 (Eliminate East Bound Lane Drop on Edens Spur)

	Predicted Crash Frequency (Crashes/Year)		
	Fatality-Injury	Property Damage Only	Total
Segment 1, Sunset Ridge to Old Willow	0.8	2.1	2.9
Intersection 1, Willow at Old Willow	1.7	3.2	4.9
Segment 2, Old Willow to Wagner	1.4	3.6	5.0
Total Crashes	3.9	8.9	12.7

Totals may not add due to rounding.

Willow Road, Sunset Ridge to Old Willow Road
HSM Urban and Suburban Arterial Predictive Method
Alternative 12 (Eliminate Eastbound Lane Drop on Edens Spur)

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

General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Sunset Ridge to Old Willow Rd
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	2U
Length of segment, L (mi)		--	0.18
AADT (veh/day)		--	33,000
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)		--	1
Major industrial / institutional driveways (number)		--	1
Minor industrial / institutional driveways (number)		--	0
Major residential driveways (number)		--	0
Minor residential driveways (number)		--	4
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	56
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	23
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	1.11	1.00	1.00	1.00	1.11

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								
	a	b	from Table 12-3	from Equation 12-10		(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(6)*(7)*(8)	
Total	-15.22	1.68	0.84	1.724	1.000	1.724	1.11	1.00	1.918
Fatal and Injury (FI)	-16.22	1.66	0.65	0.515	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.287	0.494	1.11	1.00	0.550
Property Damage Only (PDO)	-15.62	1.69	0.87	1.282	$(5)_{TOTAL} - (5)_{FI}$ 0.713	1.230	1.11	1.00	1.368

Worksheet 1D -- Multiple-Vehicle Nondrivable 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	0.550	1.000	1.368	1.918
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.730	0.401	0.778	1.065	1.466
Head-on collision	0.068	0.037	0.004	0.005	0.043
Angle collision	0.085	0.047	0.079	0.108	0.155
Sideswipe, same direction	0.015	0.008	0.031	0.042	0.051
Sideswipe, opposite direction	0.073	0.040	0.055	0.075	0.115
Other multiple-vehicle collision	0.029	0.016	0.053	0.073	0.088

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 (6) from Worksheet 1B	Calibration Factor, Cr	Predicted N _{brsv}
	from Table 12-5								
	a	b							
Total	-5.47	0.56	0.81	0.257	1.000	0.257	1.11	1.00	0.286
Fatal and Injury (FI)	-3.96	0.23	0.50	0.038	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.152	0.039	1.11	1.00	0.044
Property Damage Only (PDO)	-6.51	0.64	0.87	0.209	(5) _{TOTAL} -(5) _{FI} 0.848	0.218	1.11	1.00	0.242

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	0.044	1.000	0.242	0.286
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.026	0.001	0.066	0.016	0.017
Collision with fixed object	0.723	0.032	0.759	0.184	0.216
Collision with other object	0.010	0.000	0.013	0.003	0.004
Other single-vehicle collision	0.241	0.011	0.162	0.039	0.050

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_i from Table 12-7	Coefficient for traffic adjustment, t from Table 12-7	Initial N_{brdwy}	Overdispersion parameter, k from Table 12-7
				Equation 12-16 $n_j * N_i * (AADT/15,000)^t$	
Major commercial	0	0.158	1.000	0.000	--
Minor commercial	1	0.050	1.000	0.110	
Major industrial/institutional	1	0.172	1.000	0.378	
Minor industrial/institutional	0	0.023	1.000	0.000	
Major residential	0	0.083	1.000	0.000	
Minor residential	4	0.016	1.000	0.141	
Other	0	0.025	1.000	0.000	
Total	--	--	--	0.629	

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}) from Table 12-7	Adjusted N_{brdwy} (2) _{TOTAL} * (3)	Combined CMFs (6) from Worksheet 1B	Calibration factor, C_r	Predicted N_{brdwy} (4)*(5)*(6)
	(5) _{TOTAL} from Worksheet 1G					
Total	0.629	1.000	0.629	1.11	1.00	0.700
Fatal and injury (FI)	--	0.323	0.203	1.11	1.00	0.226
Property damage only (PDO)	--	0.677	0.426	1.11	1.00	0.474

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr} from Table 12-8	Calibration factor, C_r	Predicted N_{pedr} (5)*(6)*(7)
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			
Total	1.918	0.286	0.700	2.904	0.005	1.00	0.015
Fatal and injury (FI)	--	--	--	--	--	1.00	0.015

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker} from Table 12-9	Calibration factor, C_r	Predicted N_{biker} (5)*(6)*(7)
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			
Total	1.918	0.286	0.700	2.904	0.004	1.00	0.012
Fatal and injury (FI)	--	--	--	--	--	1.00	0.012

Willow Road, Sunset Ridge to Old Willow Road
HSM Urban and Suburban Arterial Predictive Method
Alternative 12 (Eliminate Eastbound Lane Drop on Edens Spur)

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)	0.401	1.065	1.466
Head-on collisions (from Worksheet 1D)	0.037	0.005	0.043
Angle collisions (from Worksheet 1D)	0.047	0.108	0.155
Sideswipe, same direction (from Worksheet 1D)	0.008	0.042	0.051
Sideswipe, opposite direction (from Worksheet 1D)	0.040	0.075	0.115
Driveway-related collisions (from Worksheet 1H)	0.226	0.474	0.700
Other multiple-vehicle collision (from Worksheet 1D)	0.016	0.073	0.088
Subtotal	0.776	1.842	2.618
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.001	0.016	0.017
Collision with fixed object (from Worksheet 1F)	0.032	0.184	0.216
Collision with other object (from Worksheet 1F)	0.000	0.003	0.004
Other single-vehicle collision (from Worksheet 1F)	0.011	0.039	0.050
Collision with pedestrian (from Worksheet 1I)	0.015	0.000	0.015
Collision with bicycle (from Worksheet 1J)	0.012	0.000	0.012
Subtotal	0.070	0.242	0.312
Total	0.846	2.085	2.930

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Crash Severity Level	Predicted average crash frequency, $N_{\text{predicted}}$ (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)
	(Total) from Worksheet 1K		(2) / (3)
Total	2.9	0.18	16.3
Fatal and injury (FI)	0.8	0.18	4.7
Property damage only (PDO)	2.1	0.18	11.6

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections			
General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Intersection	at Old Willow
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)		--	3ST
AADT _{major} (veh/day)		--	33,000
AADT _{minor} (veh/day)		--	3,000
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	0
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]		--	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		--	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			1
Maximum number of lanes crossed by a pedestrian (n _{lanesx})		--	0
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
<i>CMF_{1i}</i>	<i>CMF_{2i}</i>	<i>CMF_{3i}</i>	<i>CMF_{4i}</i>	<i>CMF_{5i}</i>	<i>CMF_{6i}</i>	<i>CMF_{COMB}</i>
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	1.00	1.00	1.00

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 (7) from Worksheet 2B	Calibration Factor, C_i	Predicted N_{bimv}
	from Table 12-10			from Table 12-10	from Equation 12-21		(4) _{TOTAL} *(5)			(6)*(7)*(8)
	a	b	c							
Total	-13.36	1.11	0.41	0.80	4.355	1.000	4.355	1.00	1.00	4.355
Fatal and Injury (FI)	-14.01	1.16	0.30	0.69	1.585	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.326	1.419	1.00	1.00	1.419
Property Damage Only (PDO)	-15.38	1.20	0.51	0.77	3.282	$(5)_{TOTAL}-(5)_{FI}$ 0.674	2.936	1.00	1.00	2.936

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	1.419	1.000	2.936	4.355
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.421	0.597	0.440	1.292	1.889
Head-on collision	0.045	0.064	0.023	0.068	0.131
Angle collision	0.343	0.487	0.262	0.769	1.256
Sideswipe	0.126	0.179	0.040	0.117	0.296
Other multiple-vehicle collision	0.065	0.092	0.235	0.690	0.782

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_{bisv}	Combined CMFs (7) from Worksheet 2B	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)			(6)*(7)*(8)
	a	b	c							
Total	-6.81	0.16	0.51	1.14	0.346	1.000	0.346	1.00	1.00	0.346
Fatal and Injury (FI)	--	--	--	--	0.107	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.294	0.102	1.00	1.00	0.102
Property Damage Only (PDO)	-8.36	0.25	0.55	1.29	0.258	$(5)_{TOTAL}-(5)_{FI}$ 0.706	0.244	1.00	1.00	0.244

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	0.102	1.000	0.244	0.346
		(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	0.004	0.005
Collision with fixed object	0.762	0.077	0.834	0.204	0.281
Collision with other object	0.090	0.009	0.092	0.022	0.032
Other single-vehicle collision	0.039	0.004	0.023	0.006	0.010
Single-vehicle noncollision	0.105	0.011	0.030	0.007	0.018

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Calibration factor, C _i	Predicted N _{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	4.355	0.346	4.701	0.021	1.00	0.099
Fatal and injury (FI)	--	--	--	--	1.00	0.099

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									
	a	b	c	d	e					
Total	--	--	--	--	--	--	--	--	1.00	--
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	--

Willow Road at Old Willow Road
HSM Urban and Suburban Arterial Predictive Method
Alternative 12 (Eliminate Eastbound Lane Drop on Edens Spur)

Worksheet 2J -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Intersections						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N_{bimv}	Predicted N_{bisv}	Predicted N_{bi}	f_{bikei}	Calibration factor, C_i	Predicted N_{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	4.355	0.346	4.701	0.016	1.00	0.075
Fatal and injury (FI)	--	--	--	--	1.00	0.075

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)	0.597	1.292	1.889
Head-on collisions (from Worksheet 2D)	0.064	0.068	0.131
Angle collisions (from Worksheet 2D)	0.487	0.769	1.256
Sideswipe (from Worksheet 2D)	0.179	0.117	0.296
Other multiple-vehicle collision (from Worksheet 2D)	0.092	0.690	0.782
Subtotal	1.419	2.936	4.355
SINGLE-VEHICLE			
Collision with parked vehicle (from Worksheet 2F)	0.000	0.001	0.001
Collision with animal (from Worksheet 2F)	0.000	0.004	0.005
Collision with fixed object (from Worksheet 2F)	0.077	0.204	0.281
Collision with other object (from Worksheet 2F)	0.009	0.022	0.032
Other single-vehicle collision (from Worksheet 2F)	0.004	0.006	0.010
Single-vehicle noncollision (from Worksheet 2F)	0.011	0.007	0.018
Collision with pedestrian (from Worksheet 2G or 2I)	0.099	0.000	0.099
Collision with bicycle (from Worksheet 2J)	0.075	0.000	0.075
Subtotal	0.275	0.244	0.520
Total	1.694	3.181	4.875

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

Willow Road, Old Willow Road to Wagner
HSM Urban and Suburban Arterial Predictive Method
Alternative 12 (Eliminate Eastbound Lane Drop on Edens Spur)

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

General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Old Willow Rd. to Wagner
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	2U
Length of segment, L (mi)		--	0.42
AADT (veh/day)		--	31,000
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)		--	11
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	45
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	22
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	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								
	a	b							
Total	-15.22	1.68	0.84	3.621	1.000	3.621	1.08	1.00	3.921
Fatal and Injury (FI)	-16.22	1.66	0.65	1.083	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.287	1.039	1.08	1.00	1.125
Property Damage Only (PDO)	-15.62	1.69	0.87	2.691	$(5)_{TOTAL} - (5)_{FI}$ 0.713	2.582	1.08	1.00	2.796

Worksheet 1D -- Multiple-Vehicle Nondrivable 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	1.125	1.000	2.796	3.921
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.730	0.821	0.778	2.175	2.996
Head-on collision	0.068	0.077	0.004	0.011	0.088
Angle collision	0.085	0.096	0.079	0.221	0.316
Sideswipe, same direction	0.015	0.017	0.031	0.087	0.104
Sideswipe, opposite direction	0.073	0.082	0.055	0.154	0.236
Other multiple-vehicle collision	0.029	0.033	0.053	0.148	0.181

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 (6) from Worksheet 1B	Calibration Factor, Cr	Predicted N _{brsv}
	from Table 12-5								
	a	b							
Total	-5.47	0.56	0.81	0.579	1.000	0.579	1.08	1.00	0.627
Fatal and Injury (FI)	-3.96	0.23	0.50	0.086	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.156	0.090	1.08	1.00	0.098
Property Damage Only (PDO)	-6.51	0.64	0.87	0.468	(5) _{TOTAL} -(5) _{FI} 0.844	0.489	1.08	1.00	0.530

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	0.098	1.000	0.530	0.627
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.026	0.003	0.066	0.035	0.037
Collision with fixed object	0.723	0.071	0.759	0.402	0.473
Collision with other object	0.010	0.001	0.013	0.007	0.008
Other single-vehicle collision	0.241	0.024	0.162	0.086	0.109

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_i from Table 12-7	Coefficient for traffic adjustment, t from Table 12-7	Initial N_{brdwy}	Overdispersion parameter, k from Table 12-7
				Equation 12-16 $n_j * N_i * (AADT/15,000)^t$	
Major commercial	0	0.158	1.000	0.000	--
Minor commercial	0	0.050	1.000	0.000	
Major industrial/institutional	0	0.172	1.000	0.000	
Minor industrial/institutional	0	0.023	1.000	0.000	
Major residential	0	0.083	1.000	0.000	
Minor residential	11	0.016	1.000	0.364	
Other	0	0.025	1.000	0.000	
Total	--	--	--	0.364	

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}) from Table 12-7	Adjusted N_{brdwy} (2) _{TOTAL} * (3)	Combined CMFs (6) from Worksheet 1B	Calibration factor, C_r	Predicted N_{brdwy} (4)*(5)*(6)
	(5) _{TOTAL} from Worksheet 1G					
Total	0.364	1.000	0.364	1.08	1.00	0.394
Fatal and injury (FI)	--	0.323	0.117	1.08	1.00	0.127
Property damage only (PDO)	--	0.677	0.246	1.08	1.00	0.267

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr} from Table 12-8	Calibration factor, C_r	Predicted N_{pedr} (5)*(6)*(7)
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			
Total	3.921	0.627	0.394	4.942	0.005	1.00	0.025
Fatal and injury (FI)	--	--	--	--	--	1.00	0.025

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker} from Table 12-9	Calibration factor, C_r	Predicted N_{biker} (5)*(6)*(7)
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			
Total	3.921	0.627	0.394	4.942	0.004	1.00	0.020
Fatal and injury (FI)	--	--	--	--	--	1.00	0.020

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)	0.821	2.175	2.996
Head-on collisions (from Worksheet 1D)	0.077	0.011	0.088
Angle collisions (from Worksheet 1D)	0.096	0.221	0.316
Sideswipe, same direction (from Worksheet 1D)	0.017	0.087	0.104
Sideswipe, opposite direction (from Worksheet 1D)	0.082	0.154	0.236
Driveway-related collisions (from Worksheet 1H)	0.127	0.267	0.394
Other multiple-vehicle collision (from Worksheet 1D)	0.033	0.148	0.181
Subtotal	1.252	3.062	4.315
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.003	0.035	0.037
Collision with fixed object (from Worksheet 1F)	0.071	0.402	0.473
Collision with other object (from Worksheet 1F)	0.001	0.007	0.008
Other single-vehicle collision (from Worksheet 1F)	0.024	0.086	0.109
Collision with pedestrian (from Worksheet 1I)	0.025	0.000	0.025
Collision with bicycle (from Worksheet 1J)	0.020	0.000	0.020
Subtotal	0.142	0.530	0.672
Total	1.394	3.592	4.986

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	5.0	0.42	11.9
Fatal and injury (FI)	1.4	0.42	3.3
Property damage only (PDO)	3.6	0.42	8.6

Alternative 13
Full Interchange I-94 at Dundee Road
Safety Performance Calculations

Willow Road - Sunset Ridge Road to Wagner Road
 2040 Predicted Crash Frequency
 Alternative 13 (Full Interchange I-94 at Dundee Road)

	Predicted Crash Frequency (Crashes/Year)		
	Fatality-Injury	Property Damage Only	Total
Segment 1, Sunset Ridge to Old Willow	0.8	2.0	2.8
Intersection 1, Willow at Old Willow	1.6	3.1	4.7
Segment 2, Old Willow to Wagner	1.3	3.4	4.7
Total Crashes	3.8	8.5	12.2

Totals may not add due to rounding.

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

General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Sunset Ridge to Old Willow Rd
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data	Base Conditions	Site Conditions	
Roadway type (2U, 3T, 4U, 4D, ST)	--	2U	
Length of segment, L (mi)	--	0.18	
AADT (veh/day)	--	32,000	
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)	--	1	
Major industrial / institutional driveways (number)	--	1	
Minor industrial / institutional driveways (number)	--	0	
Major residential driveways (number)	--	0	
Minor residential driveways (number)	--	4	
Other driveways (number)	--	0	
Speed Category	--	Posted Speed Greater than 30 mph	
Roadside fixed object density (fixed objects / mi)	0	56	
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]	30	23	
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	1.11	1.00	1.00	1.00	1.11

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 Equation 12-10	(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(6)*(7)*(8)
	a	b											
Total	-15.22	1.68	0.84	1.637	1.000	1.637	1.11	1.00	1.821				
Fatal and Injury (FI)	-16.22	1.66	0.65	0.489	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.287	0.469	1.11	1.00	0.522				
Property Damage Only (PDO)	-15.62	1.69	0.87	1.217	$(5)_{TOTAL} - (5)_{FI}$ 0.713	1.167	1.11	1.00	1.299				

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	0.522	1.000	1.299	1.821
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.730	0.381	0.778	1.011	1.392
Head-on collision	0.068	0.036	0.004	0.005	0.041
Angle collision	0.085	0.044	0.079	0.103	0.147
Sideswipe, same direction	0.015	0.008	0.031	0.040	0.048
Sideswipe, opposite direction	0.073	0.038	0.055	0.071	0.110
Other multiple-vehicle collision	0.029	0.015	0.053	0.069	0.084

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 a	b	from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)	(6) from Worksheet 1B		(6)*(7)*(8)
Total	-5.47	0.56	0.81	0.253	1.000	0.253	1.11	1.00	0.281
Fatal and Injury (FI)	-3.96	0.23	0.50	0.037	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.154	0.039	1.11	1.00	0.043
Property Damage Only (PDO)	-6.51	0.64	0.87	0.205	(5) _{TOTAL} -(5) _{FI} 0.846	0.214	1.11	1.00	0.238

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	0.043	1.000	0.238	0.281
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.026	0.001	0.066	0.016	0.017
Collision with fixed object	0.723	0.031	0.759	0.181	0.212
Collision with other object	0.010	0.000	0.013	0.003	0.004
Other single-vehicle collision	0.241	0.010	0.162	0.039	0.049

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_i from Table 12-7	Coefficient for traffic adjustment, t from Table 12-7	Initial N_{brdwy}	Overdispersion parameter, k from Table 12-7	
				Equation 12-16 $n_j * N_j * (AADT/15,000)^t$		
Major commercial	0	0.158	1.000	0.000	--	
Minor commercial	1	0.050	1.000	0.107		
Major industrial/institutional	1	0.172	1.000	0.367		
Minor industrial/institutional	0	0.023	1.000	0.000		
Major residential	0	0.083	1.000	0.000		
Minor residential	4	0.016	1.000	0.137		
Other	0	0.025	1.000	0.000		
Total	--	--	--	0.610		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}) from Table 12-7	Adjusted N_{brdwy} (2) _{TOTAL} * (3)	Combined CMFs (6) from Worksheet 1B	Calibration factor, C_r	Predicted N_{brdwy} (4)*(5)*(6)
	(5) _{TOTAL} from Worksheet 1G					
Total	0.610	1.000	0.610	1.11	1.00	0.679
Fatal and injury (FI)	--	0.323	0.197	1.11	1.00	0.219
Property damage only (PDO)	--	0.677	0.413	1.11	1.00	0.460

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr} from Table 12-8	Calibration factor, C_r	Predicted N_{pedr} (5)*(6)*(7)
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			
Total	1.821	0.281	0.679	2.782	0.005	1.00	0.014
Fatal and injury (FI)	--	--	--	--	--	1.00	0.014

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker} from Table 12-9	Calibration factor, C_r	Predicted N_{biker} (5)*(6)*(7)
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			
Total	1.821	0.281	0.679	2.782	0.004	1.00	0.011
Fatal and injury (FI)	--	--	--	--	--	1.00	0.011

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)	0.381	1.011	1.392
Head-on collisions (from Worksheet 1D)	0.036	0.005	0.041
Angle collisions (from Worksheet 1D)	0.044	0.103	0.147
Sideswipe, same direction (from Worksheet 1D)	0.008	0.040	0.048
Sideswipe, opposite direction (from Worksheet 1D)	0.038	0.071	0.110
Driveway-related collisions (from Worksheet 1H)	0.219	0.460	0.679
Other multiple-vehicle collision (from Worksheet 1D)	0.015	0.069	0.084
Subtotal	0.742	1.759	2.500
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.001	0.016	0.017
Collision with fixed object (from Worksheet 1F)	0.031	0.181	0.212
Collision with other object (from Worksheet 1F)	0.000	0.003	0.004
Other single-vehicle collision (from Worksheet 1F)	0.010	0.039	0.049
Collision with pedestrian (from Worksheet 1I)	0.014	0.000	0.014
Collision with bicycle (from Worksheet 1J)	0.011	0.000	0.011
Subtotal	0.068	0.238	0.306
Total	0.810	1.997	2.807

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	2.8	0.18	15.6
Fatal and injury (FI)	0.8	0.18	4.5
Property damage only (PDO)	2.0	0.18	11.1

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections			
General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Intersection	at Old Willow
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)		--	3ST
AADT _{major} (veh/day)		--	32,000
AADT _{minor} (veh/day)		--	3,000
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	0
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]		--	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		--	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			1
Maximum number of lanes crossed by a pedestrian (n _{lanesx})		--	0
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
<i>CMF_{1i}</i>	<i>CMF_{2i}</i>	<i>CMF_{3i}</i>	<i>CMF_{4i}</i>	<i>CMF_{5i}</i>	<i>CMF_{6i}</i>	<i>CMF_{COMB}</i>
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	1.00	1.00	1.00

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	4.209	1.000	4.209	1.00	1.00	4.209
Fatal and Injury (FI)	-14.01	1.16	0.30	0.69	1.530	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.326	1.372	1.00	1.00	1.372
Property Damage Only (PDO)	-15.38	1.20	0.51	0.77	3.163	$(5)_{TOTAL}-(5)_{FI}$ 0.674	2.837	1.00	1.00	2.837

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
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Total	1.000	1.372	1.000	2.837	4.209
Rear-end collision	0.421	0.578	0.440	1.248	1.826
Head-on collision	0.045	0.062	0.023	0.065	0.127
Angle collision	0.343	0.471	0.262	0.743	1.214
Sideswipe	0.126	0.173	0.040	0.113	0.286
Other multiple-vehicle collision	0.065	0.089	0.235	0.667	0.756

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	0.344	1.000	0.344	1.00	1.00	0.344
Fatal and Injury (FI)	--	--	--	--	0.107	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.294	0.101	1.00	1.00	0.101
Property Damage Only (PDO)	-8.36	0.25	0.55	1.29	0.256	$(5)_{TOTAL}-(5)_{FI}$ 0.706	0.243	1.00	1.00	0.243

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	0.243	0.344
		(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	0.004	0.005
Collision with fixed object	0.762	0.077	0.834	0.203	0.280
Collision with other object	0.090	0.009	0.092	0.022	0.031
Other single-vehicle collision	0.039	0.004	0.023	0.006	0.010
Single-vehicle noncollision	0.105	0.011	0.030	0.007	0.018

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Calibration factor, C _i	Predicted N _{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	4.209	0.344	4.553	0.021	1.00	0.096
Fatal and injury (FI)	--	--	--	--	1.00	0.096

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									
	a	b	c	d	e					
Total	--	--	--	--	--	--	--	--	1.00	--
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	--

Worksheet 2J -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Intersections						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N_{bimv}	Predicted N_{bisv}	Predicted N_{bi}	f_{bikei}	Calibration factor, C_i	Predicted N_{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	4.209	0.344	4.553	0.016	1.00	0.073
Fatal and injury (FI)	--	--	--	--	1.00	0.073

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)	0.578	1.248	1.826
Head-on collisions (from Worksheet 2D)	0.062	0.065	0.127
Angle collisions (from Worksheet 2D)	0.471	0.743	1.214
Sideswipe (from Worksheet 2D)	0.173	0.113	0.286
Other multiple-vehicle collision (from Worksheet 2D)	0.089	0.667	0.756
Subtotal	1.372	2.837	4.209
SINGLE-VEHICLE			
Collision with parked vehicle (from Worksheet 2F)	0.000	0.001	0.001
Collision with animal (from Worksheet 2F)	0.000	0.004	0.005
Collision with fixed object (from Worksheet 2F)	0.077	0.203	0.280
Collision with other object (from Worksheet 2F)	0.009	0.022	0.031
Other single-vehicle collision (from Worksheet 2F)	0.004	0.006	0.010
Single-vehicle noncollision (from Worksheet 2F)	0.011	0.007	0.018
Collision with pedestrian (from Worksheet 2G or 2I)	0.096	0.000	0.096
Collision with bicycle (from Worksheet 2J)	0.073	0.000	0.073
Subtotal	0.270	0.243	0.513
Total	1.642	3.080	4.721

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	4.7
Fatal and injury (FI)	1.6
Property damage only (PDO)	3.1

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

General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Old Willow Rd. to Wagner
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	2U
Length of segment, L (mi)		--	0.42
AADT (veh/day)		--	30,000
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)		--	11
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	45
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	22
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	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								
	a	b	from Table 12-3	from Equation 12-10		(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(6)*(7)*(8)	
Total	-15.22	1.68	0.84	3.427	1.000	3.427	1.08	1.00	3.711
Fatal and Injury (FI)	-16.22	1.66	0.65	1.026	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.287	0.984	1.08	1.00	1.065
Property Damage Only (PDO)	-15.62	1.69	0.87	2.546	$(5)_{TOTAL} - (5)_{FI}$ 0.713	2.443	1.08	1.00	2.645

Worksheet 1D -- Multiple-Vehicle Nondrivable 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	1.065	1.000	2.645	3.711
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.730	0.778	0.778	2.058	2.836
Head-on collision	0.068	0.072	0.004	0.011	0.083
Angle collision	0.085	0.091	0.079	0.209	0.300
Sideswipe, same direction	0.015	0.016	0.031	0.082	0.098
Sideswipe, opposite direction	0.073	0.078	0.055	0.145	0.223
Other multiple-vehicle collision	0.029	0.031	0.053	0.140	0.171

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 (6) from Worksheet 1B	Calibration Factor, Cr	Predicted N _{brsv}
	from Table 12-5								
	a	b							
Total	-5.47	0.56	0.81	0.569	1.000	0.569	1.08	1.00	0.616
Fatal and Injury (FI)	-3.96	0.23	0.50	0.086	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.158	0.090	1.08	1.00	0.097
Property Damage Only (PDO)	-6.51	0.64	0.87	0.459	(5) _{TOTAL} -(5) _{FI} 0.842	0.479	1.08	1.00	0.519

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	0.097	1.000	0.519	0.616
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.026	0.003	0.066	0.034	0.037
Collision with fixed object	0.723	0.070	0.759	0.394	0.464
Collision with other object	0.010	0.001	0.013	0.007	0.008
Other single-vehicle collision	0.241	0.023	0.162	0.084	0.107

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_i	Coefficient for traffic adjustment, t	Initial N_{brdwy}	Overdispersion parameter, k
		from Table 12-7	from Table 12-7	Equation 12-16 $n_i * N_i * (AADT/15,000)^t$	from Table 12-7
Major commercial	0	0.158	1.000	0.000	--
Minor commercial	0	0.050	1.000	0.000	
Major industrial/institutional	0	0.172	1.000	0.000	
Minor industrial/institutional	0	0.023	1.000	0.000	
Major residential	0	0.083	1.000	0.000	
Minor residential	11	0.016	1.000	0.352	
Other	0	0.025	1.000	0.000	
Total	--	--	--	0.352	

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	0.352	1.000	0.352	1.08	1.00	0.381
Fatal and injury (FI)	--	0.323	0.114	1.08	1.00	0.123
Property damage only (PDO)	--	0.677	0.238	1.08	1.00	0.258

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr}	Calibration factor, C_r	Predicted N_{pedr}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	3.711	0.616	0.381	4.708	0.005	1.00	0.024
Fatal and injury (FI)	--	--	--	--	--	1.00	0.024

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker}	Calibration factor, C_r	Predicted N_{biker}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	3.711	0.616	0.381	4.708	0.004	1.00	0.019
Fatal and injury (FI)	--	--	--	--	--	1.00	0.019

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)	0.778	2.058	2.836
Head-on collisions (from Worksheet 1D)	0.072	0.011	0.083
Angle collisions (from Worksheet 1D)	0.091	0.209	0.300
Sideswipe, same direction (from Worksheet 1D)	0.016	0.082	0.098
Sideswipe, opposite direction (from Worksheet 1D)	0.078	0.145	0.223
Driveway-related collisions (from Worksheet 1H)	0.123	0.258	0.381
Other multiple-vehicle collision (from Worksheet 1D)	0.031	0.140	0.171
Subtotal	1.189	2.903	4.092
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.003	0.034	0.037
Collision with fixed object (from Worksheet 1F)	0.070	0.394	0.464
Collision with other object (from Worksheet 1F)	0.001	0.007	0.008
Other single-vehicle collision (from Worksheet 1F)	0.023	0.084	0.107
Collision with pedestrian (from Worksheet 1I)	0.024	0.000	0.024
Collision with bicycle (from Worksheet 1J)	0.019	0.000	0.019
Subtotal	0.139	0.519	0.658
Total	1.328	3.422	4.750

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Crash Severity Level	Predicted average crash frequency, $N_{\text{predicted}}$ (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)
	(Total) from Worksheet 1K		(2) / (3)
Total	4.7	0.42	11.3
Fatal and injury (FI)	1.3	0.42	3.2
Property damage only (PDO)	3.4	0.42	8.1

Alternative 14
Full Interchange I-94 at Tower Road
Safety Performance Calculations

Willow Road - Sunset Ridge Road to Wagner Road
 2040 Predicted Crash Frequency
 Alternative 14 (Full Interchange I-94 at Tower Road)

	Predicted Crash Frequency (Crashes/Year)		
	Fatality-Injury	Property Damage Only	Total
Segment 1, Sunset Ridge to Old Willow	0.8	2.1	2.9
Intersection 1, Willow at Old Willow	1.7	3.2	4.9
Segment 2, Old Willow to Wagner	1.4	3.6	4.9
Total Crashes	3.9	8.9	12.7

Totals may not add due to rounding.

Willow Road, Sunset Ridge to Old Willow Road
HSM Urban and Suburban Arterial Predictive Method
Alternative 14 (Full Interchange I-94 at Tower Road)

Worksheet 1A -- General Information and Input Data for Urban and Suburban Roadway Segments			
General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Sunset Ridge to Old Willow Rd
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	2U
Length of segment, L (mi)		--	0.18
AADT (veh/day)		--	33,000
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)		--	1
Major industrial / institutional driveways (number)		--	1
Minor industrial / institutional driveways (number)		--	0
Major residential driveways (number)		--	0
Minor residential driveways (number)		--	4
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	56
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	23
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	1.11	1.00	1.00	1.00	1.11

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 Equation 12-10	(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(6)*(7)*(8)
	a	b											
Total	-15.22	1.68	0.84	1.724	1.000	1.724	1.11	1.00	1.918				
Fatal and Injury (FI)	-16.22	1.66	0.65	0.515	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.287	0.494	1.11	1.00	0.550				
Property Damage Only (PDO)	-15.62	1.69	0.87	1.282	$(5)_{TOTAL} - (5)_{FI}$ 0.713	1.230	1.11	1.00	1.368				

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	0.550	1.000	1.368	1.918
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.730	0.401	0.778	1.065	1.466
Head-on collision	0.068	0.037	0.004	0.005	0.043
Angle collision	0.085	0.047	0.079	0.108	0.155
Sideswipe, same direction	0.015	0.008	0.031	0.042	0.051
Sideswipe, opposite direction	0.073	0.040	0.055	0.075	0.115
Other multiple-vehicle collision	0.029	0.016	0.053	0.073	0.088

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}
	a	b	from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)	(6) from Worksheet 1B		(6)*(7)*(8)
Total	-5.47	0.56	0.81	0.257	1.000	0.257	1.11	1.00	0.286
Fatal and Injury (FI)	-3.96	0.23	0.50	0.038	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.152	0.039	1.11	1.00	0.044
Property Damage Only (PDO)	-6.51	0.64	0.87	0.209	(5) _{TOTAL} -(5) _{FI} 0.848	0.218	1.11	1.00	0.242

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	0.044	1.000	0.242	0.286
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.026	0.001	0.066	0.016	0.017
Collision with fixed object	0.723	0.032	0.759	0.184	0.216
Collision with other object	0.010	0.000	0.013	0.003	0.004
Other single-vehicle collision	0.241	0.011	0.162	0.039	0.050

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_i from Table 12-7	Coefficient for traffic adjustment, t from Table 12-7	Initial N_{brdwy}	Overdispersion parameter, k from Table 12-7	
				Equation 12-16 $n_j * N_j * (AADT/15,000)^t$		
Major commercial	0	0.158	1.000	0.000	--	
Minor commercial	1	0.050	1.000	0.110		
Major industrial/institutional	1	0.172	1.000	0.378		
Minor industrial/institutional	0	0.023	1.000	0.000		
Major residential	0	0.083	1.000	0.000		
Minor residential	4	0.016	1.000	0.141		
Other	0	0.025	1.000	0.000		
Total	--	--	--	0.629		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}) from Table 12-7	Adjusted N_{brdwy} (2) _{TOTAL} * (3)	Combined CMFs (6) from Worksheet 1B	Calibration factor, C_r	Predicted N_{brdwy} (4)*(5)*(6)
	(5) _{TOTAL} from Worksheet 1G					
Total	0.629	1.000	0.629	1.11	1.00	0.700
Fatal and injury (FI)	--	0.323	0.203	1.11	1.00	0.226
Property damage only (PDO)	--	0.677	0.426	1.11	1.00	0.474

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr} from Table 12-8	Calibration factor, C_r	Predicted N_{pedr} (5)*(6)*(7)
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			
Total	1.918	0.286	0.700	2.904	0.005	1.00	0.015
Fatal and injury (FI)	--	--	--	--	--	1.00	0.015

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker} from Table 12-9	Calibration factor, C_r	Predicted N_{biker} (5)*(6)*(7)
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			
Total	1.918	0.286	0.700	2.904	0.004	1.00	0.012
Fatal and injury (FI)	--	--	--	--	--	1.00	0.012

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)	0.401	1.065	1.466
Head-on collisions (from Worksheet 1D)	0.037	0.005	0.043
Angle collisions (from Worksheet 1D)	0.047	0.108	0.155
Sideswipe, same direction (from Worksheet 1D)	0.008	0.042	0.051
Sideswipe, opposite direction (from Worksheet 1D)	0.040	0.075	0.115
Driveway-related collisions (from Worksheet 1H)	0.226	0.474	0.700
Other multiple-vehicle collision (from Worksheet 1D)	0.016	0.073	0.088
Subtotal	0.776	1.842	2.618
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.001	0.016	0.017
Collision with fixed object (from Worksheet 1F)	0.032	0.184	0.216
Collision with other object (from Worksheet 1F)	0.000	0.003	0.004
Other single-vehicle collision (from Worksheet 1F)	0.011	0.039	0.050
Collision with pedestrian (from Worksheet 1I)	0.015	0.000	0.015
Collision with bicycle (from Worksheet 1J)	0.012	0.000	0.012
Subtotal	0.070	0.242	0.312
Total	0.846	2.085	2.930

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	2.9	0.18	16.3
Fatal and injury (FI)	0.8	0.18	4.7
Property damage only (PDO)	2.1	0.18	11.6

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections

General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Intersection	at Old Willow
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)		--	3ST
AADT _{major} (veh/day)		--	33,000
AADT _{minor} (veh/day)		--	3,000
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	0
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]		--	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		--	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			1
Maximum number of lanes crossed by a pedestrian (n _{lanes})		--	0
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
<i>CMF_{1i}</i>	<i>CMF_{2i}</i>	<i>CMF_{3i}</i>	<i>CMF_{4i}</i>	<i>CMF_{5i}</i>	<i>CMF_{6i}</i>	<i>CMF_{COMB}</i>
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	1.00	1.00	1.00

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 from Table 12-10	Initial N _{bimv} from Equation 12-21	Proportion of Total Crashes	Adjusted N _{bimv} (4) _{TOTAL} *(5)	Combined CMFs (7) from Worksheet 2B	Calibration Factor, C _i	Predicted N _{bimv} (6)*(7)*(8)
	from Table 12-10									
	a	b	c							
Total	-13.36	1.11	0.41	0.80	4.355	1.000	4.355	1.00	1.00	4.355
Fatal and Injury (FI)	-14.01	1.16	0.30	0.69	1.585	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.326	1.419	1.00	1.00	1.419
Property Damage Only (PDO)	-15.38	1.20	0.51	0.77	3.282	$(5)_{TOTAL} - (5)_{FI}$ 0.674	2.936	1.00	1.00	2.936

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	1.419	1.000	2.936	4.355
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	$(3)+(5)$
Rear-end collision	0.421	0.597	0.440	1.292	1.889
Head-on collision	0.045	0.064	0.023	0.068	0.131
Angle collision	0.343	0.487	0.262	0.769	1.256
Sideswipe	0.126	0.179	0.040	0.117	0.296
Other multiple-vehicle collision	0.065	0.092	0.235	0.690	0.782

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 from Table 12-12	Initial N _{bisv} from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27	Proportion of Total Crashes	Adjusted N _{bimv} (4) _{TOTAL} *(5)	Combined CMFs (7) from Worksheet 2B	Calibration Factor, C _i	Predicted N _{bisv} (6)*(7)*(8)
	from Table 12-12									
	a	b	c							
Total	-6.81	0.16	0.51	1.14	0.346	1.000	0.346	1.00	1.00	0.346
Fatal and Injury (FI)	--	--	--	--	0.107	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.294	0.102	1.00	1.00	0.102
Property Damage Only (PDO)	-8.36	0.25	0.55	1.29	0.258	$(5)_{TOTAL} - (5)_{FI}$ 0.706	0.244	1.00	1.00	0.244

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	0.102 (2)*(3) _{FI}	1.000	0.244 (4)*(5) _{PDO}	0.346 (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	0.004	0.005
Collision with fixed object	0.762	0.077	0.834	0.204	0.281
Collision with other object	0.090	0.009	0.092	0.022	0.032
Other single-vehicle collision	0.039	0.004	0.023	0.006	0.010
Single-vehicle noncollision	0.105	0.011	0.030	0.007	0.018

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Calibration factor, C _i	Predicted N _{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	4.355	0.346	4.701	0.021	1.00	0.099
Fatal and injury (FI)	--	--	--	--	1.00	0.099

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
	a	b	c	d	e					
Total	--	--	--	--	--	--	--	--	1.00	--
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	--

Worksheet 2J -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N_{bimv}	Predicted N_{bisv}	Predicted N_{bi}	f_{bikei}	Calibration factor, C_i	Predicted N_{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	4.355	0.346	4.701	0.016	1.00	0.075
Fatal and injury (FI)	--	--	--	--	1.00	0.075

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)	0.597	1.292	1.889
Head-on collisions (from Worksheet 2D)	0.064	0.068	0.131
Angle collisions (from Worksheet 2D)	0.487	0.769	1.256
Sideswipe (from Worksheet 2D)	0.179	0.117	0.296
Other multiple-vehicle collision (from Worksheet 2D)	0.092	0.690	0.782
Subtotal	1.419	2.936	4.355
SINGLE-VEHICLE			
Collision with parked vehicle (from Worksheet 2F)	0.000	0.001	0.001
Collision with animal (from Worksheet 2F)	0.000	0.004	0.005
Collision with fixed object (from Worksheet 2F)	0.077	0.204	0.281
Collision with other object (from Worksheet 2F)	0.009	0.022	0.032
Other single-vehicle collision (from Worksheet 2F)	0.004	0.006	0.010
Single-vehicle noncollision (from Worksheet 2F)	0.011	0.007	0.018
Collision with pedestrian (from Worksheet 2G or 2I)	0.099	0.000	0.099
Collision with bicycle (from Worksheet 2J)	0.075	0.000	0.075
Subtotal	0.275	0.244	0.520
Total	1.694	3.181	4.875

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	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Old Willow Rd. to Wagner
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	2U
Length of segment, L (mi)		--	0.42
AADT (veh/day)		--	31,000
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)		--	11
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	45
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	22
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	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 Equation 12-10	(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(6)*(7)*(8)
	a	b											
Total	-15.22	1.68	0.84	3.621	1.000	3.621	1.08	1.00	3.921				
Fatal and Injury (FI)	-16.22	1.66	0.65	1.083	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.287	1.039	1.08	1.00	1.125				
Property Damage Only (PDO)	-15.62	1.69	0.87	2.691	$(5)_{TOTAL}-(5)_{FI}$ 0.713	2.582	1.08	1.00	2.796				

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	1.125	1.000	2.796	3.921
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.730	0.821	0.778	2.175	2.996
Head-on collision	0.068	0.077	0.004	0.011	0.088
Angle collision	0.085	0.096	0.079	0.221	0.316
Sideswipe, same direction	0.015	0.017	0.031	0.087	0.104
Sideswipe, opposite direction	0.073	0.082	0.055	0.154	0.236
Other multiple-vehicle collision	0.029	0.033	0.053	0.148	0.181

Worksheet 1E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
	SPF Coefficients		Overdispersion 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)
Total	a	b	0.81	0.579	1.000	0.579	1.08	1.00	0.627
Fatal and Injury (FI)	-5.47	0.56	0.50	0.086	(4) _{FI} /((4) _{FI} +(4) _{PDO})	0.090	1.08	1.00	0.098
Property Damage Only (PDO)	-3.96	0.23	0.87	0.468	(5) _{TOTAL} -(5) _{FI}	0.489	1.08	1.00	0.530
	-6.51	0.64			0.844				

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	0.098	1.000	0.530	0.627
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.026	0.003	0.066	0.035	0.037
Collision with fixed object	0.723	0.071	0.759	0.402	0.473
Collision with other object	0.010	0.001	0.013	0.007	0.008
Other single-vehicle collision	0.241	0.024	0.162	0.086	0.109

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_i	Coefficient for traffic adjustment, t	Initial N_{brdwy}	Overdispersion parameter, k	
		from Table 12-7	from Table 12-7	Equation 12-16 $n_j * N_j * (AADT/15,000)^t$		
Major commercial	0	0.158	1.000	0.000	--	
Minor commercial	0	0.050	1.000	0.000		
Major industrial/institutional	0	0.172	1.000	0.000		
Minor industrial/institutional	0	0.023	1.000	0.000		
Major residential	0	0.083	1.000	0.000		
Minor residential	11	0.016	1.000	0.364		
Other	0	0.025	1.000	0.000		
Total	--	--	--	0.364		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	0.364	1.000	0.364	1.08	1.00	0.394
Fatal and injury (FI)	--	0.323	0.117	1.08	1.00	0.127
Property damage only (PDO)	--	0.677	0.246	1.08	1.00	0.267

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr}	Calibration factor, C_r	Predicted N_{pedr}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	3.921	0.627	0.394	4.942	0.005	1.00	0.025
Fatal and injury (FI)	--	--	--	--	--	1.00	0.025

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker}	Calibration factor, C_r	Predicted N_{biker}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	3.921	0.627	0.394	4.942	0.004	1.00	0.020
Fatal and injury (FI)	--	--	--	--	--	1.00	0.020

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)	0.821	2.175	2.996
Head-on collisions (from Worksheet 1D)	0.077	0.011	0.088
Angle collisions (from Worksheet 1D)	0.096	0.221	0.316
Sideswipe, same direction (from Worksheet 1D)	0.017	0.087	0.104
Sideswipe, opposite direction (from Worksheet 1D)	0.082	0.154	0.236
Driveway-related collisions (from Worksheet 1H)	0.127	0.267	0.394
Other multiple-vehicle collision (from Worksheet 1D)	0.033	0.148	0.181
Subtotal	1.252	3.062	4.315
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.003	0.035	0.037
Collision with fixed object (from Worksheet 1F)	0.071	0.402	0.473
Collision with other object (from Worksheet 1F)	0.001	0.007	0.008
Other single-vehicle collision (from Worksheet 1F)	0.024	0.086	0.109
Collision with pedestrian (from Worksheet 1I)	0.025	0.000	0.025
Collision with bicycle (from Worksheet 1J)	0.020	0.000	0.020
Subtotal	0.142	0.530	0.672
Total	1.394	3.592	4.986

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	5.0	0.42	11.9
Fatal and injury (FI)	1.4	0.42	3.3
Property damage only (PDO)	3.6	0.42	8.6

Alternative 15
Full Interchange I-94 at Willow Road
Safety Performance Calculations

Willow Road - Sunset Ridge Road to Wagner Road
2040 Predicted Crash Frequency
Alternative 15 (Full Interchange I-94 at Willow Road)

	Predicted Crash Frequency (Crashes/Year)		
	Fatality-Injury	Property Damage Only	Total
Segment 1, Sunset Ridge to Old Willow	0.8	2.1	2.9
Intersection 1, Willow at Old Willow	1.7	3.2	4.9
Segment 2, Old Willow to Wagner	1.3	3.4	4.7
Total Crashes	3.8	8.7	12.5

Totals may not add due to rounding.

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

General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Sunset Ridge to Old Willow Rd
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	2U
Length of segment, L (mi)		--	0.18
AADT (veh/day)		--	33,000
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)		--	1
Major industrial / institutional driveways (number)		--	1
Minor industrial / institutional driveways (number)		--	0
Major residential driveways (number)		--	0
Minor residential driveways (number)		--	4
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	56
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	23
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	1.11	1.00	1.00	1.00	1.11

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	-15.22	1.68	0.84	1.724	1.000	1.724	1.11	1.00	1.918					
Fatal and Injury (FI)	-16.22	1.66	0.65	0.515	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.287	0.494	1.11	1.00	0.550					
Property Damage Only (PDO)	-15.62	1.69	0.87	1.282	$(5)_{TOTAL} - (5)_{FI}$ 0.713	1.230	1.11	1.00	1.368					

Worksheet 1D -- Multiple-Vehicle Nondrivable 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	0.550	1.000	1.368	1.918
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.730	0.401	0.778	1.065	1.466
Head-on collision	0.068	0.037	0.004	0.005	0.043
Angle collision	0.085	0.047	0.079	0.108	0.155
Sideswipe, same direction	0.015	0.008	0.031	0.042	0.051
Sideswipe, opposite direction	0.073	0.040	0.055	0.075	0.115
Other multiple-vehicle collision	0.029	0.016	0.053	0.073	0.088

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 (6) from Worksheet 1B	Calibration Factor, Cr	Predicted N _{brsv}
	from Table 12-5								
	a	b	from Table 12-5	from Equation 12-13	(4) _{TOTAL} *(5)	(6)*(7)*(8)			
Total	-5.47	0.56	0.81	0.257	1.000	0.257	1.11	1.00	0.286
Fatal and Injury (FI)	-3.96	0.23	0.50	0.038	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.152	0.039	1.11	1.00	0.044
Property Damage Only (PDO)	-6.51	0.64	0.87	0.209	(5) _{TOTAL} -(5) _{FI} 0.848	0.218	1.11	1.00	0.242

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	0.044	1.000	0.242	0.286
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.026	0.001	0.066	0.016	0.017
Collision with fixed object	0.723	0.032	0.759	0.184	0.216
Collision with other object	0.010	0.000	0.013	0.003	0.004
Other single-vehicle collision	0.241	0.011	0.162	0.039	0.050

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_i	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	0.158	1.000	0.000	--
Minor commercial	1	0.050	1.000	0.110	
Major industrial/institutional	1	0.172	1.000	0.378	
Minor industrial/institutional	0	0.023	1.000	0.000	
Major residential	0	0.083	1.000	0.000	
Minor residential	4	0.016	1.000	0.141	
Other	0	0.025	1.000	0.000	
Total	--	--	--	0.629	

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	0.629	1.000	0.629	1.11	1.00	0.700
Fatal and injury (FI)	--	0.323	0.203	1.11	1.00	0.226
Property damage only (PDO)	--	0.677	0.426	1.11	1.00	0.474

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr}	Calibration factor, C_r	Predicted N_{pedr}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	1.918	0.286	0.700	2.904	0.005	1.00	0.015
Fatal and injury (FI)	--	--	--	--	--	1.00	0.015

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker}	Calibration factor, C_r	Predicted N_{biker}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	1.918	0.286	0.700	2.904	0.004	1.00	0.012
Fatal and injury (FI)	--	--	--	--	--	1.00	0.012

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)
	Fatal and injury (FI)	Property damage only (PDO)	Total
Collision type	(3) from Worksheet 1D and 1F; (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)	0.401	1.065	1.466
Head-on collisions (from Worksheet 1D)	0.037	0.005	0.043
Angle collisions (from Worksheet 1D)	0.047	0.108	0.155
Sideswipe, same direction (from Worksheet 1D)	0.008	0.042	0.051
Sideswipe, opposite direction (from Worksheet 1D)	0.040	0.075	0.115
Driveway-related collisions (from Worksheet 1H)	0.226	0.474	0.700
Other multiple-vehicle collision (from Worksheet 1D)	0.016	0.073	0.088
Subtotal	0.776	1.842	2.618
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.001	0.016	0.017
Collision with fixed object (from Worksheet 1F)	0.032	0.184	0.216
Collision with other object (from Worksheet 1F)	0.000	0.003	0.004
Other single-vehicle collision (from Worksheet 1F)	0.011	0.039	0.050
Collision with pedestrian (from Worksheet 1I)	0.015	0.000	0.015
Collision with bicycle (from Worksheet 1J)	0.012	0.000	0.012
Subtotal	0.070	0.242	0.312
Total	0.846	2.085	2.930

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)
Crash Severity Level	Predicted average crash frequency, $N_{\text{predicted}}$ (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)
	(Total) from Worksheet 1K		(2) / (3)
Total	2.9	0.18	16.3
Fatal and injury (FI)	0.8	0.18	4.7
Property damage only (PDO)	2.1	0.18	11.6

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections

General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Intersection	at Old Willow
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)		--	3ST
AADT _{major} (veh/day)		--	33,000
AADT _{minor} (veh/day)		--	3,000
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	0
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]		--	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		--	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			1
Maximum number of lanes crossed by a pedestrian (n _{lanes})		--	0
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
<i>CMF_{1i}</i>	<i>CMF_{2i}</i>	<i>CMF_{3i}</i>	<i>CMF_{4i}</i>	<i>CMF_{5i}</i>	<i>CMF_{6i}</i>	<i>CMF_{COMB}</i>
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	1.00	1.00	1.00

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									
	a	b	c							
Total	-13.36	1.11	0.41	0.80	4.355	1.000	4.355	1.00	1.00	4.355
Fatal and Injury (FI)	-14.01	1.16	0.30	0.69	1.585	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.326	1.419	1.00	1.00	1.419
Property Damage Only (PDO)	-15.38	1.20	0.51	0.77	3.282	$(5)_{TOTAL}-(5)_{FI}$ 0.674	2.936	1.00	1.00	2.936

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	1.419	1.000	2.936	4.355
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.421	0.597	0.440	1.292	1.889
Head-on collision	0.045	0.064	0.023	0.068	0.131
Angle collision	0.343	0.487	0.262	0.769	1.256
Sideswipe	0.126	0.179	0.040	0.117	0.296
Other multiple-vehicle collision	0.065	0.092	0.235	0.690	0.782

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									
	a	b	c							
Total	-6.81	0.16	0.51	1.14	0.346	1.000	0.346	1.00	1.00	0.346
Fatal and Injury (FI)	--	--	--	--	0.107	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.294	0.102	1.00	1.00	0.102
Property Damage Only (PDO)	-8.36	0.25	0.55	1.29	0.258	$(5)_{TOTAL}-(5)_{FI}$ 0.706	0.244	1.00	1.00	0.244

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	0.102 (2)*(3) _{FI}	1.000	0.244 (4)*(5) _{PDO}	0.346 (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	0.004	0.005
Collision with fixed object	0.762	0.077	0.834	0.204	0.281
Collision with other object	0.090	0.009	0.092	0.022	0.032
Other single-vehicle collision	0.039	0.004	0.023	0.006	0.010
Single-vehicle noncollision	0.105	0.011	0.030	0.007	0.018

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Calibration factor, C _i	Predicted N _{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	4.355	0.346	4.701	0.021	1.00	0.099
Fatal and injury (FI)	--	--	--	--	1.00	0.099

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
	a	b	c	d	e					
Total	--	--	--	--	--	--	--	--	1.00	--
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	--

Worksheet 2J -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N_{bimv}	Predicted N_{bisv}	Predicted N_{bi}	f_{bikei}	Calibration factor, C_i	Predicted N_{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	4.355	0.346	4.701	0.016	1.00	0.075
Fatal and injury (FI)	--	--	--	--	1.00	0.075

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)	0.597	1.292	1.889
Head-on collisions (from Worksheet 2D)	0.064	0.068	0.131
Angle collisions (from Worksheet 2D)	0.487	0.769	1.256
Sideswipe (from Worksheet 2D)	0.179	0.117	0.296
Other multiple-vehicle collision (from Worksheet 2D)	0.092	0.690	0.782
Subtotal	1.419	2.936	4.355
SINGLE-VEHICLE			
Collision with parked vehicle (from Worksheet 2F)	0.000	0.001	0.001
Collision with animal (from Worksheet 2F)	0.000	0.004	0.005
Collision with fixed object (from Worksheet 2F)	0.077	0.204	0.281
Collision with other object (from Worksheet 2F)	0.009	0.022	0.032
Other single-vehicle collision (from Worksheet 2F)	0.004	0.006	0.010
Single-vehicle noncollision (from Worksheet 2F)	0.011	0.007	0.018
Collision with pedestrian (from Worksheet 2G or 2I)	0.099	0.000	0.099
Collision with bicycle (from Worksheet 2J)	0.075	0.000	0.075
Subtotal	0.275	0.244	0.520
Total	1.694	3.181	4.875

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	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Old Willow Rd. to Wagner
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	2U
Length of segment, L (mi)		--	0.42
AADT (veh/day)		--	30,000
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)		--	11
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	45
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	22
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	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}
	a	b							
Total	-15.22	1.68	0.84	3.427	1.000	3.427	1.08	1.00	3.711
Fatal and Injury (FI)	-16.22	1.66	0.65	1.026	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.287	0.984	1.08	1.00	1.065
Property Damage Only (PDO)	-15.62	1.69	0.87	2.546	$(5)_{TOTAL} - (5)_{FI}$ 0.713	2.443	1.08	1.00	2.645

Worksheet 1D -- Multiple-Vehicle Nondrivable 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	1.065	1.000	2.645	3.711
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.730	0.778	0.778	2.058	2.836
Head-on collision	0.068	0.072	0.004	0.011	0.083
Angle collision	0.085	0.091	0.079	0.209	0.300
Sideswipe, same direction	0.015	0.016	0.031	0.082	0.098
Sideswipe, opposite direction	0.073	0.078	0.055	0.145	0.223
Other multiple-vehicle collision	0.029	0.031	0.053	0.140	0.171

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 (6) from Worksheet 1B	Calibration Factor, Cr	Predicted N _{brsv}
	from Table 12-5		from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)			(6)*(7)*(8)
	a	b							
Total	-5.47	0.56	0.81	0.569	1.000	0.569	1.08	1.00	0.616
Fatal and Injury (FI)	-3.96	0.23	0.50	0.086	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.158	0.090	1.08	1.00	0.097
Property Damage Only (PDO)	-6.51	0.64	0.87	0.459	(5) _{TOTAL} -(5) _{FI} 0.842	0.479	1.08	1.00	0.519

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	0.097	1.000	0.519	0.616
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.026	0.003	0.066	0.034	0.037
Collision with fixed object	0.723	0.070	0.759	0.394	0.464
Collision with other object	0.010	0.001	0.013	0.007	0.008
Other single-vehicle collision	0.241	0.023	0.162	0.084	0.107

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_i	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	0.158	1.000	0.000	--
Minor commercial	0	0.050	1.000	0.000	
Major industrial/institutional	0	0.172	1.000	0.000	
Minor industrial/institutional	0	0.023	1.000	0.000	
Major residential	0	0.083	1.000	0.000	
Minor residential	11	0.016	1.000	0.352	
Other	0	0.025	1.000	0.000	
Total	--	--	--	0.352	

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	0.352	1.000	0.352	1.08	1.00	0.381
Fatal and injury (FI)	--	0.323	0.114	1.08	1.00	0.123
Property damage only (PDO)	--	0.677	0.238	1.08	1.00	0.258

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr}	Calibration factor, C_r	Predicted N_{pedr}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	3.711	0.616	0.381	4.708	0.005	1.00	0.024
Fatal and injury (FI)	--	--	--	--	--	1.00	0.024

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker}	Calibration factor, C_r	Predicted N_{biker}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	3.711	0.616	0.381	4.708	0.004	1.00	0.019
Fatal and injury (FI)	--	--	--	--	--	1.00	0.019

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)	0.778	2.058	2.836
Head-on collisions (from Worksheet 1D)	0.072	0.011	0.083
Angle collisions (from Worksheet 1D)	0.091	0.209	0.300
Sideswipe, same direction (from Worksheet 1D)	0.016	0.082	0.098
Sideswipe, opposite direction (from Worksheet 1D)	0.078	0.145	0.223
Driveway-related collisions (from Worksheet 1H)	0.123	0.258	0.381
Other multiple-vehicle collision (from Worksheet 1D)	0.031	0.140	0.171
Subtotal	1.189	2.903	4.092
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.003	0.034	0.037
Collision with fixed object (from Worksheet 1F)	0.070	0.394	0.464
Collision with other object (from Worksheet 1F)	0.001	0.007	0.008
Other single-vehicle collision (from Worksheet 1F)	0.023	0.084	0.107
Collision with pedestrian (from Worksheet 1I)	0.024	0.000	0.024
Collision with bicycle (from Worksheet 1J)	0.019	0.000	0.019
Subtotal	0.139	0.519	0.658
Total	1.328	3.422	4.750

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Crash Severity Level	Predicted average crash frequency, $N_{\text{predicted}}$ (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)
	(Total) from Worksheet 1K		(2) / (3)
Total	4.7	0.42	11.3
Fatal and injury (FI)	1.3	0.42	3.2
Property damage only (PDO)	3.4	0.42	8.1

Alternative 16
Full Interchange I-94 at Lake Avenue
Safety Performance Calculations

Willow Road - Sunset Ridge Road to Wagner Road
 2040 Predicted Crash Frequency
 Alternative 16 (Full Interchange I-94 at Lake Avenue)

	Predicted Crash Frequency (Crashes/Year)		
	Fatality-Injury	Property Damage Only	Total
Segment 1, Sunset Ridge to Old Willow	0.8	2.0	2.8
Intersection 1, Willow at Old Willow	1.6	3.1	4.7
Segment 2, Old Willow to Wagner	1.3	3.4	4.7
Total Crashes	3.8	8.5	12.2

Totals may not add due to rounding.

Worksheet 1A -- General Information and Input Data for Urban and Suburban Roadway Segments			
General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Sunset Ridge to Old Willow Rd
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	2U
Length of segment, L (mi)		--	0.18
AADT (veh/day)		--	32,000
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)		--	1
Major industrial / institutional driveways (number)		--	1
Minor industrial / institutional driveways (number)		--	0
Major residential driveways (number)		--	0
Minor residential driveways (number)		--	4
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	56
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	23
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	1.11	1.00	1.00	1.00	1.11

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	-15.22	1.68	0.84	1.637	1.000	1.637	1.11	1.00	1.821					
Fatal and Injury (FI)	-16.22	1.66	0.65	0.489	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.287	0.469	1.11	1.00	0.522					
Property Damage Only (PDO)	-15.62	1.69	0.87	1.217	$(5)_{TOTAL} - (5)_{FI}$ 0.713	1.167	1.11	1.00	1.299					

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	0.522	1.000	1.299	1.821
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.730	0.381	0.778	1.011	1.392
Head-on collision	0.068	0.036	0.004	0.005	0.041
Angle collision	0.085	0.044	0.079	0.103	0.147
Sideswipe, same direction	0.015	0.008	0.031	0.040	0.048
Sideswipe, opposite direction	0.073	0.038	0.055	0.071	0.110
Other multiple-vehicle collision	0.029	0.015	0.053	0.069	0.084

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}
	a	b	from Table 12-5	from Equation 12-13		(4) _{TOTAL} *(5)			(6) from Worksheet 1B
Total	-5.47	0.56	0.81	0.253	1.000	0.253	1.11	1.00	0.281
Fatal and Injury (FI)	-3.96	0.23	0.50	0.037	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.154	0.039	1.11	1.00	0.043
Property Damage Only (PDO)	-6.51	0.64	0.87	0.205	(5) _{TOTAL} -(5) _{FI} 0.846	0.214	1.11	1.00	0.238

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	0.043	1.000	0.238	0.281
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.026	0.001	0.066	0.016	0.017
Collision with fixed object	0.723	0.031	0.759	0.181	0.212
Collision with other object	0.010	0.000	0.013	0.003	0.004
Other single-vehicle collision	0.241	0.010	0.162	0.039	0.049

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_i from Table 12-7	Coefficient for traffic adjustment, t from Table 12-7	Initial N_{brdwy}	Overdispersion parameter, k from Table 12-7	
				Equation 12-16 $n_j * N_j * (AADT/15,000)^t$		
Major commercial	0	0.158	1.000	0.000	--	
Minor commercial	1	0.050	1.000	0.107		
Major industrial/institutional	1	0.172	1.000	0.367		
Minor industrial/institutional	0	0.023	1.000	0.000		
Major residential	0	0.083	1.000	0.000		
Minor residential	4	0.016	1.000	0.137		
Other	0	0.025	1.000	0.000		
Total	--	--	--	0.610		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}) from Table 12-7	Adjusted N_{brdwy} (2) _{TOTAL} * (3)	Combined CMFs (6) from Worksheet 1B	Calibration factor, C_r	Predicted N_{brdwy} (4)*(5)*(6)
	(5) _{TOTAL} from Worksheet 1G					
Total	0.610	1.000	0.610	1.11	1.00	0.679
Fatal and injury (FI)	--	0.323	0.197	1.11	1.00	0.219
Property damage only (PDO)	--	0.677	0.413	1.11	1.00	0.460

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr} from Table 12-8	Calibration factor, C_r	Predicted N_{pedr} (5)*(6)*(7)
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			
Total	1.821	0.281	0.679	2.782	0.005	1.00	0.014
Fatal and injury (FI)	--	--	--	--	--	1.00	0.014

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker} from Table 12-9	Calibration factor, C_r	Predicted N_{biker} (5)*(6)*(7)
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)			
Total	1.821	0.281	0.679	2.782	0.004	1.00	0.011
Fatal and injury (FI)	--	--	--	--	--	1.00	0.011

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)	0.381	1.011	1.392
Head-on collisions (from Worksheet 1D)	0.036	0.005	0.041
Angle collisions (from Worksheet 1D)	0.044	0.103	0.147
Sideswipe, same direction (from Worksheet 1D)	0.008	0.040	0.048
Sideswipe, opposite direction (from Worksheet 1D)	0.038	0.071	0.110
Driveway-related collisions (from Worksheet 1H)	0.219	0.460	0.679
Other multiple-vehicle collision (from Worksheet 1D)	0.015	0.069	0.084
Subtotal	0.742	1.759	2.500
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.001	0.016	0.017
Collision with fixed object (from Worksheet 1F)	0.031	0.181	0.212
Collision with other object (from Worksheet 1F)	0.000	0.003	0.004
Other single-vehicle collision (from Worksheet 1F)	0.010	0.039	0.049
Collision with pedestrian (from Worksheet 1I)	0.014	0.000	0.014
Collision with bicycle (from Worksheet 1J)	0.011	0.000	0.011
Subtotal	0.068	0.238	0.306
Total	0.810	1.997	2.807

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	2.8	0.18	15.6
Fatal and injury (FI)	0.8	0.18	4.5
Property damage only (PDO)	2.0	0.18	11.1

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections			
General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Intersection	at Old Willow
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)		--	3ST
AADT _{major} (veh/day)		--	32,000
AADT _{minor} (veh/day)		--	3,000
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	0
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]		--	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		--	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			1
Maximum number of lanes crossed by a pedestrian (n _{lanesx})		--	0
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
<i>CMF_{1i}</i>	<i>CMF_{2i}</i>	<i>CMF_{3i}</i>	<i>CMF_{4i}</i>	<i>CMF_{5i}</i>	<i>CMF_{6i}</i>	<i>CMF_{COMB}</i>
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	1.00	1.00	1.00

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 (7) from Worksheet 2B	Calibration Factor, C_i	Predicted N_{bimv}
	from Table 12-10			from Table 12-10	from Equation 12-21		(4) _{TOTAL} * (5)			(6) * (7) * (8)
	a	b	c							
Total	-13.36	1.11	0.41	0.80	4.209	1.000	4.209	1.00	1.00	4.209
Fatal and Injury (FI)	-14.01	1.16	0.30	0.69	1.530	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.326	1.372	1.00	1.00	1.372
Property Damage Only (PDO)	-15.38	1.20	0.51	0.77	3.163	$(5)_{TOTAL} - (5)_{FI}$ 0.674	2.837	1.00	1.00	2.837

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	1.372	1.000	2.837	4.209
		$(2) * (3)_{FI}$		$(4) * (5)_{PDO}$	$(3) + (5)$
Rear-end collision	0.421	0.578	0.440	1.248	1.826
Head-on collision	0.045	0.062	0.023	0.065	0.127
Angle collision	0.343	0.471	0.262	0.743	1.214
Sideswipe	0.126	0.173	0.040	0.113	0.286
Other multiple-vehicle collision	0.065	0.089	0.235	0.667	0.756

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_{bisv}	Combined CMFs (7) from Worksheet 2B	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)			(6) * (7) * (8)
	a	b	c							
Total	-6.81	0.16	0.51	1.14	0.344	1.000	0.344	1.00	1.00	0.344
Fatal and Injury (FI)	--	--	--	--	0.107	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.294	0.101	1.00	1.00	0.101
Property Damage Only (PDO)	-8.36	0.25	0.55	1.29	0.256	$(5)_{TOTAL} - (5)_{FI}$ 0.706	0.243	1.00	1.00	0.243

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	0.243	0.344
		(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	0.004	0.005
Collision with fixed object	0.762	0.077	0.834	0.203	0.280
Collision with other object	0.090	0.009	0.092	0.022	0.031
Other single-vehicle collision	0.039	0.004	0.023	0.006	0.010
Single-vehicle noncollision	0.105	0.011	0.030	0.007	0.018

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N _{bimv}	Predicted N _{bisv}	Predicted N _{bi}	f _{pedi}	Calibration factor, C _i	Predicted N _{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	4.209	0.344	4.553	0.021	1.00	0.096
Fatal and injury (FI)	--	--	--	--	1.00	0.096

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									
	a	b	c	d	e					
Total	--	--	--	--	--	--	--	--	1.00	--
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	--

Worksheet 2J -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Intersections						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	Predicted N_{bimv}	Predicted N_{bisv}	Predicted N_{bi}	f_{bikei}	Calibration factor, C_i	Predicted N_{pedi}
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	4.209	0.344	4.553	0.016	1.00	0.073
Fatal and injury (FI)	--	--	--	--	1.00	0.073

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)	0.578	1.248	1.826
Head-on collisions (from Worksheet 2D)	0.062	0.065	0.127
Angle collisions (from Worksheet 2D)	0.471	0.743	1.214
Sideswipe (from Worksheet 2D)	0.173	0.113	0.286
Other multiple-vehicle collision (from Worksheet 2D)	0.089	0.667	0.756
Subtotal	1.372	2.837	4.209
SINGLE-VEHICLE			
Collision with parked vehicle (from Worksheet 2F)	0.000	0.001	0.001
Collision with animal (from Worksheet 2F)	0.000	0.004	0.005
Collision with fixed object (from Worksheet 2F)	0.077	0.203	0.280
Collision with other object (from Worksheet 2F)	0.009	0.022	0.031
Other single-vehicle collision (from Worksheet 2F)	0.004	0.006	0.010
Single-vehicle noncollision (from Worksheet 2F)	0.011	0.007	0.018
Collision with pedestrian (from Worksheet 2G or 2I)	0.096	0.000	0.096
Collision with bicycle (from Worksheet 2J)	0.073	0.000	0.073
Subtotal	0.270	0.243	0.513
Total	1.642	3.080	4.721

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	4.7
Fatal and injury (FI)	1.6
Property damage only (PDO)	3.1

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

General Information		Location Information	
Analyst	R. Jacox	Roadway	Willow Road
Agency or Company	TranSystems	Roadway Section	Old Willow Rd. to Wagner
Date Performed	03/10/11	Jurisdiction	IDOT
		Analysis Year	2040
Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	2U
Length of segment, L (mi)		--	0.42
AADT (veh/day)		--	30,000
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)		--	11
Other driveways (number)		--	0
Speed Category		--	Posted Speed Greater than 30 mph
Roadside fixed object density (fixed objects / mi)		0	45
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	22
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
<i>CMF 1r</i>	<i>CMF 2r</i>	<i>CMF 3r</i>	<i>CMF 4r</i>	<i>CMF 5r</i>	<i>CMF comb</i>
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	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								
	a	b	from Table 12-3	from Equation 12-10	(4) _{TOTAL} *(5)	(6) from Worksheet 1B	(6)*(7)*(8)		
Total	-15.22	1.68	0.84	3.427	1.000	3.427	1.08	1.00	3.711
Fatal and Injury (FI)	-16.22	1.66	0.65	1.026	$(4)_{FI} / ((4)_{FI} + (4)_{PDO})$ 0.287	0.984	1.08	1.00	1.065
Property Damage Only (PDO)	-15.62	1.69	0.87	2.546	$(5)_{TOTAL} - (5)_{FI}$ 0.713	2.443	1.08	1.00	2.645

Worksheet 1D -- Multiple-Vehicle Nondrivable 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	1.065	1.000	2.645	3.711
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Rear-end collision	0.730	0.778	0.778	2.058	2.836
Head-on collision	0.068	0.072	0.004	0.011	0.083
Angle collision	0.085	0.091	0.079	0.209	0.300
Sideswipe, same direction	0.015	0.016	0.031	0.082	0.098
Sideswipe, opposite direction	0.073	0.078	0.055	0.145	0.223
Other multiple-vehicle collision	0.029	0.031	0.053	0.140	0.171

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 (6) from Worksheet 1B	Calibration Factor, Cr	Predicted N _{brsv}
	from Table 12-5								
	a	b							
Total	-5.47	0.56	0.81	0.569	1.000	0.569	1.08	1.00	0.616
Fatal and Injury (FI)	-3.96	0.23	0.50	0.086	(4) _{FI} /((4) _{FI} +(4) _{PDO}) 0.158	0.090	1.08	1.00	0.097
Property Damage Only (PDO)	-6.51	0.64	0.87	0.459	(5) _{TOTAL} -(5) _{FI} 0.842	0.479	1.08	1.00	0.519

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	0.097	1.000	0.519	0.616
		(2)*(3) _{FI}		(4)*(5) _{PDO}	(3)+(5)
Collision with animal	0.026	0.003	0.066	0.034	0.037
Collision with fixed object	0.723	0.070	0.759	0.394	0.464
Collision with other object	0.010	0.001	0.013	0.007	0.008
Other single-vehicle collision	0.241	0.023	0.162	0.084	0.107

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_i from Table 12-7	Coefficient for traffic adjustment, t from Table 12-7	Initial N_{brdwy}	Overdispersion parameter, k from Table 12-7
				Equation 12-16 $n_i * N_j * (AADT/15,000)^t$	
Major commercial	0	0.158	1.000	0.000	--
Minor commercial	0	0.050	1.000	0.000	
Major industrial/institutional	0	0.172	1.000	0.000	
Minor industrial/institutional	0	0.023	1.000	0.000	
Major residential	0	0.083	1.000	0.000	
Minor residential	11	0.016	1.000	0.352	
Other	0	0.025	1.000	0.000	
Total	--	--	--	0.352	

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}) from Table 12-7	Adjusted N_{brdwy} (2) _{TOTAL} * (3)	Combined CMFs (6) from Worksheet 1B	Calibration factor, C_r	Predicted N_{brdwy}
	(5) _{TOTAL} from Worksheet 1G	(4)* N_{brdwy}	(4)* N_{brdwy}			
Total	0.352	1.000	0.352	1.08	1.00	0.381
Fatal and injury (FI)	--	0.323	0.114	1.08	1.00	0.123
Property damage only (PDO)	--	0.677	0.238	1.08	1.00	0.258

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{pedr} from Table 12-8	Calibration factor, C_r	Predicted N_{pedr}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	(5)*(6)*(7)		
Total	3.711	0.616	0.381	4.708	0.005	1.00	0.024
Fatal and injury (FI)	--	--	--	--	--	1.00	0.024

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	Predicted N_{brmv}	Predicted N_{brsv}	Predicted N_{brdwy}	Predicted N_{br}	f_{biker} from Table 12-9	Calibration factor, C_r	Predicted N_{biker}
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	(5)*(6)*(7)		
Total	3.711	0.616	0.381	4.708	0.004	1.00	0.019
Fatal and injury (FI)	--	--	--	--	--	1.00	0.019

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)	0.778	2.058	2.836
Head-on collisions (from Worksheet 1D)	0.072	0.011	0.083
Angle collisions (from Worksheet 1D)	0.091	0.209	0.300
Sideswipe, same direction (from Worksheet 1D)	0.016	0.082	0.098
Sideswipe, opposite direction (from Worksheet 1D)	0.078	0.145	0.223
Driveway-related collisions (from Worksheet 1H)	0.123	0.258	0.381
Other multiple-vehicle collision (from Worksheet 1D)	0.031	0.140	0.171
Subtotal	1.189	2.903	4.092
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.003	0.034	0.037
Collision with fixed object (from Worksheet 1F)	0.070	0.394	0.464
Collision with other object (from Worksheet 1F)	0.001	0.007	0.008
Other single-vehicle collision (from Worksheet 1F)	0.023	0.084	0.107
Collision with pedestrian (from Worksheet 1I)	0.024	0.000	0.024
Collision with bicycle (from Worksheet 1J)	0.019	0.000	0.019
Subtotal	0.139	0.519	0.658
Total	1.328	3.422	4.750

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Crash Severity Level	Predicted average crash frequency, $N_{\text{predicted}}$ (crashes/year)	Roadway segment length, L (mi)	Crash rate (crashes/mi/year)
	(Total) from Worksheet 1K		(2) / (3)
Total	4.7	0.42	11.3
Fatal and injury (FI)	1.3	0.42	3.2
Property damage only (PDO)	3.4	0.42	8.1