



Montana Roadway Departure Safety Training Workshop



Class Presentation and
Montana Safety Knowledge Base

Prepared by DiExSys, LLC
November 2013




Roadway Departure Workshop

Data Driven Approach to Solving Run Off the Road Safety Problems

Jake Kononov, P.E. Ph.D.
Bryan K. Allery, P.E.

Road Departure Class - November 2013




As Civil Engineers, we don't need convincing that how the road is built influences frequency and severity of crashes on it

Some believe that roads built to standards are safe and that if crashes occur on such roads they are caused by bad driving

Others believe that crashes occur on all roads and that road safety is a matter of degree and

That compliance with standards is not a sufficient safeguard to prevent all crashes

Accidents occur on crest curves with good sight distance, on horizontal curves with adequate super-elevation and curve signing in compliance with the MUTCD

Road Departure Class - November 2013




Let's Examine How Much Safety there is Behind a Few Basic Geometric and Operational Standards:

Vertical Stopping Sight Distance

Radius, Speed, Side-friction, and Superelevation

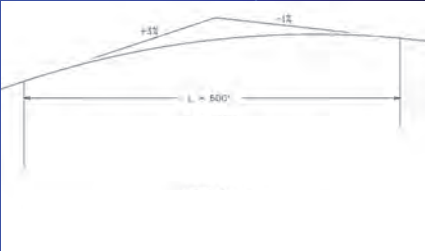
Lane Width and Safety

85th Percentile in Setting Speed Limits

Road Departure Class - November 2013

Design Standards and Safety

AASHTO Standards – Vertical Curve



Is the Curve Safer Now?
Why did the Formula Change?

Road Departure Class - November 2013

Design Standards and Safety

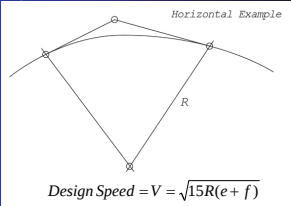
AASHTO Standards – Horizontal Curve

Before:

- The curve is 900 feet
- There is a 4 percent superelevation
- There is a friction factor of .14
- $V = 49.3$ MPH

After:

- The curve is 1200 feet
- There is a 4 percent superelevation
- There is a friction factor of .14
- $V = 56.9$ MPH

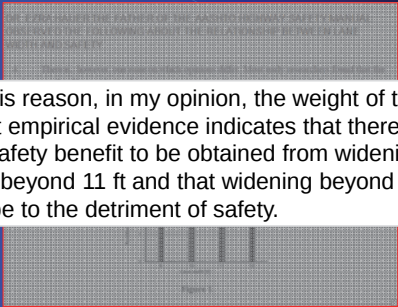


Design Speed $= V = \sqrt{15R(e + f)}$

Which Curve is Safer?
By How Much is it Safer?

Road Departure Class - November 2013

Design Standards and Safety



For this reason, in my opinion, the weight of the extant empirical evidence indicates that there is little safety benefit to be obtained from widening lanes beyond 11 ft and that widening beyond 12 ft may be to the detriment of safety.

Road Departure Class - November 2013




85th Percentile Revisited

Jake Kononov, P.E. Ph.D.
Bryan K. Allery, P.E.

Road Departure Class - November 2013




History of Speed Limits

- Today speed limits on freeways are established by computing 85th percentile speed during free-flow (Off Peak) period
- This methodology was developed over 50 years ago by David Solomon (USDOT, 1964)
- But it appears that Solomon (Accidents on Main Rural highways related to speed, USDOT, 1964) may not have been as wise as the King Solomon (971 - 931 BC , Jerusalem)
- In fact we will show that the speed limit established during the Off Peak period using 85th percentile free-flow speed is sometimes detrimental to safety

Road Departure Class - November 2013




History of Speed Limits

ACCIDENTS ON MAIN RURAL HIGHWAYS
RELATED TO
SPEED, DRIVER, and VEHICLE

Reported by David Solomon
Chief, Safety Research Branch
Traffic Research Division
Office of Research and Development

3 1965 00118 8308

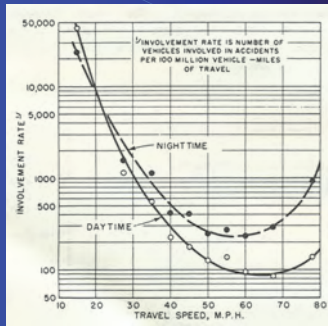


U.S. DEPARTMENT OF COMMERCE
LUTHER S. BROWN, Secretary
BUREAU OF PUBLIC ROADS
RAY M. WATSON, Administrator

United States Government Printing Office: Washington, D.C. 20540

Road Departure Class - November 2013

History of Speed Limits



Road Departure Class - November 2013

Accidents on Main Rural Highways David Solomon 1964

PREFACE

One of the important findings of this study is that the greater the differential in speed of a driver and his vehicle from the average speed of all traffic, the greater the chance of that driver being involved in an accident. For example, a driver traveling at 40 or 80 miles per hour in relation to an average speed of 60 miles per hour for all traffic has a substantially greater chance of being involved in an accident than a driver traveling at the **AVERAGE SPEED**.

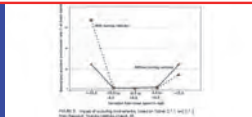
Please Note:
AVERAGE
does not mean
85th Percentile

Many members of the State Police have made substantial contributions to the planning and conduct of this study, particularly Edward R. Wilson, Charles W. Cook, David Terzaghi, and Curtis L. Hoffberger, Jr.

Road Departure Class - November 2013

Speed and Safety – TRR 2103 Ezra Hauer TRB 2009

Foremost is the fact that many of the slow-vehicle accidents in Solomon's data involved turning vehicles. Therefore what appears to be due to low speed may be partly due to the maneuver that necessitated it. This question was later explored in a study by the Research Triangle Institute (RTI) that found that 44% of accidents and 56% of accident involvements "had at least one vehicle directly involved in some turning maneuver or was directly influenced by another vehicle . . . involved in some turning maneuver" (8, p. 18).

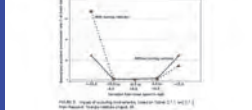


Road Departure Class - November 2013

Speed and Safety – TRR 2103 Ezra Hauer TRB 2009

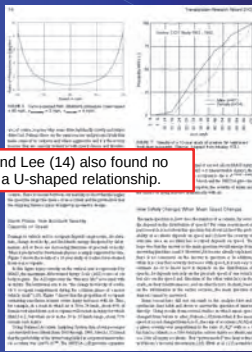


Attempts to replicate Solomon's U curve were not successful. Munden (13) found that drivers observed once during his study did not yield a U-shaped curve.



Road Departure Class - November 2013

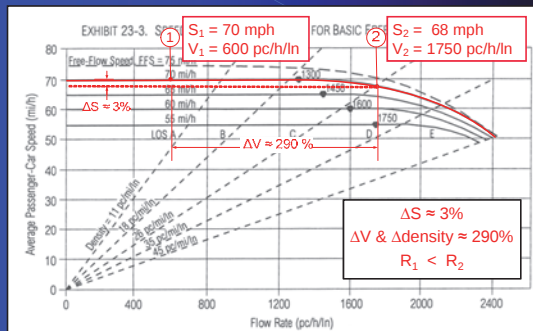
Speed and Safety – TRR 2103 Ezra Hauer TRB 2009



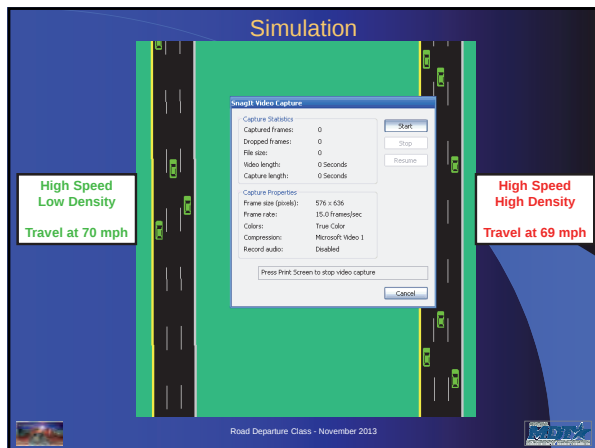
Fildes and Lee (14) also found no trace of a U-shaped relationship.

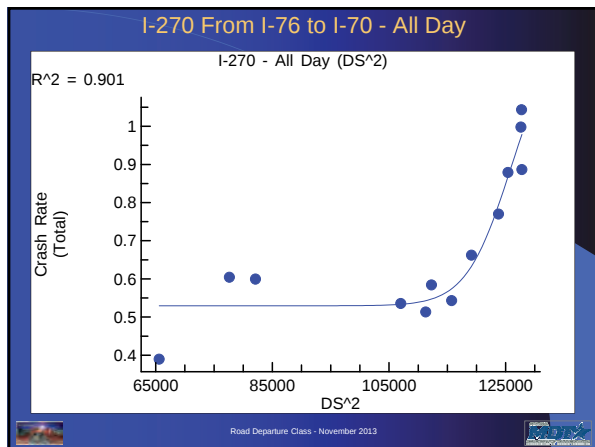
Road Departure Class - November 2013

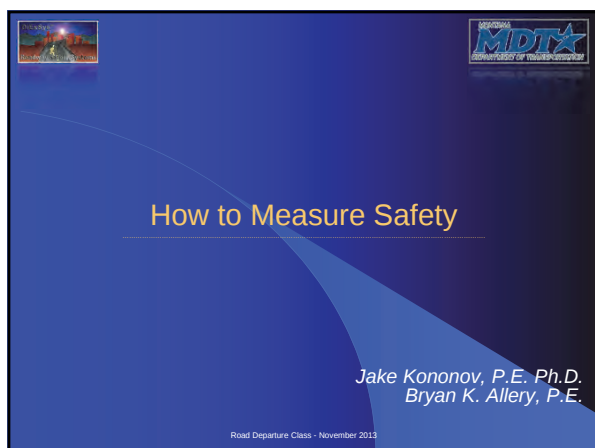
Fundamental Relationship Between Freeway Speed and Flow from HCM



Road Departure Class - November 2013







How to Measure Safety

In Order to Manage Safety Effectively,
We Need to be Able to Measure it

Road Departure Class - November 2013

How to Measure Safety

How much Safety can we Expect?
How Many Run off the Road Crashes are
too Many?
How much Safety for how much Money
can we Obtain?

Road Departure Class - November 2013

How to Measure Safety

How To Measure Safety?

Accident Rate is
the Most Common
Measure of Safety

Road Departure Class - November 2013

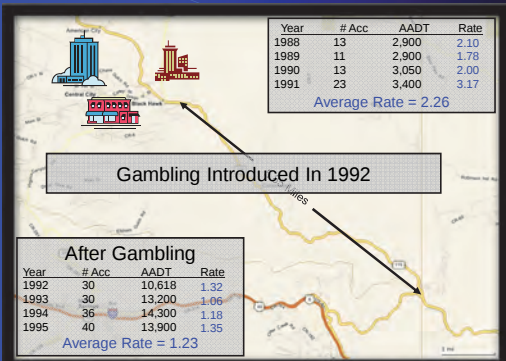
How to Measure Safety

Rate = $\frac{\# \text{Acc} \times 1,000,000}{\text{AADT} \times 365 \times \text{Length}}$

Let's Examine Its Application...

Road Departure Class - November 2013

How to Measure Safety



Year # Acc AADT Rate

1988	13	2,900	2.10
1989	11	2,900	1.78
1990	13	3,050	2.00
1991	23	3,400	3.17

Average Rate = 2.26

Gambling Introduced In 1992

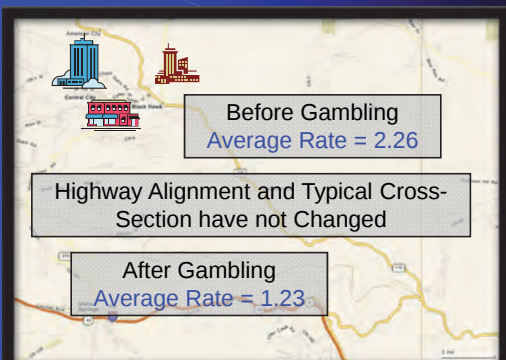
After Gambling

Year	# Acc	AADT	Rate
1992	30	10,618	1.32
1993	30	13,200	1.06
1994	36	14,300	1.18
1995	40	13,900	1.35

Average Rate = 1.23

Road Departure Class - November 2013

How to Measure Safety



Before Gambling
Average Rate = 2.26

Highway Alignment and Typical Cross-Section have not Changed

After Gambling
Average Rate = 1.23

Road Departure Class - November 2013

How to Measure Safety

After the Introduction of Gambling, the % of Accidents Involving Alcohol increased 500%.

Is Drinking and Driving in Concert with Gambling Good for Safety?

Probably not, but if Accident Rates are Used as a Measuring Device One Would have to Conclude that it is.

Road Departure Class - November 2013

How to Measure Safety

AADT	APMPY	APMVM
3,062	2.56	2.28
13,004	5.81	1.22

Road Departure Class - November 2013

How to Measure Safety

1990
58 Crashes
36,010 AADT

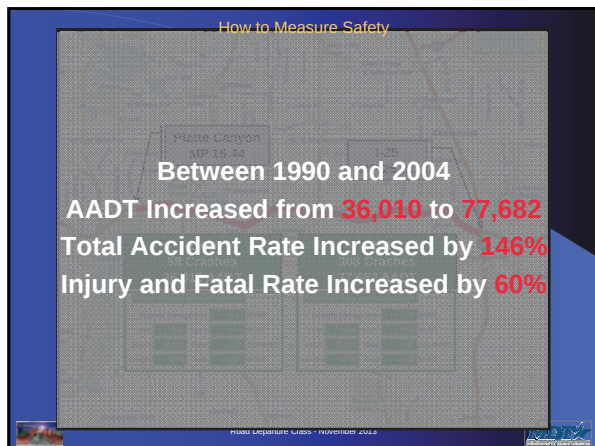
Crash Rates and Totals	
Property Damage Only	10.00 M/MT
Year	1990
Hours	2,080 M/MT
AADT	36,010
Length	12.75
Total	10.41 M/MT

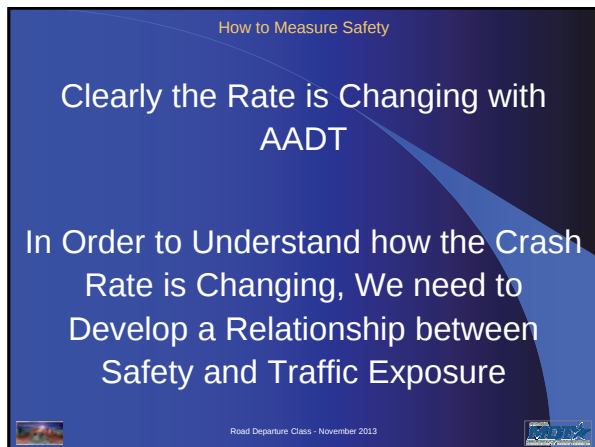
2004
308 Crashes
77,682 AADT

Crash Rates and Totals	
Property Damage Only	10.00 M/MT
Year	2004
Hours	2,080 M/MT
AADT	77,682
Length	12.75
Total	10.41 M/MT

Road Departure Class - November 2013

9










Calibration of Safety Performance Functions in Rural and Urban Environments

Jake Kononov, P.E. Ph.D.
Bryan K. Allery, P.E.

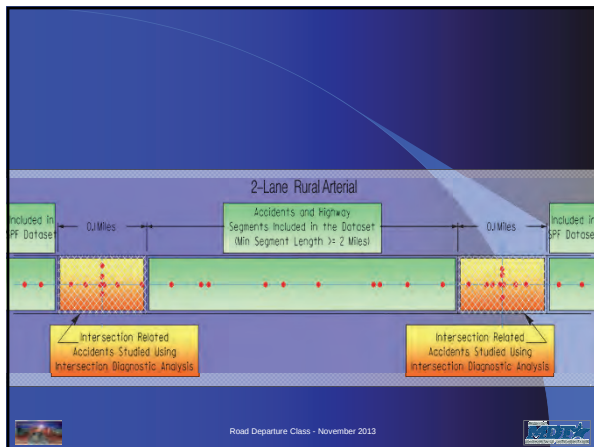
Road Departure Class - November 2013




Dataset Preparation

Road Departure Class - November 2013



2-Lane Rural Arterial

Accidents and Highway Segments Included in the Dataset (Min Segment Length ≥ 2 Miles)

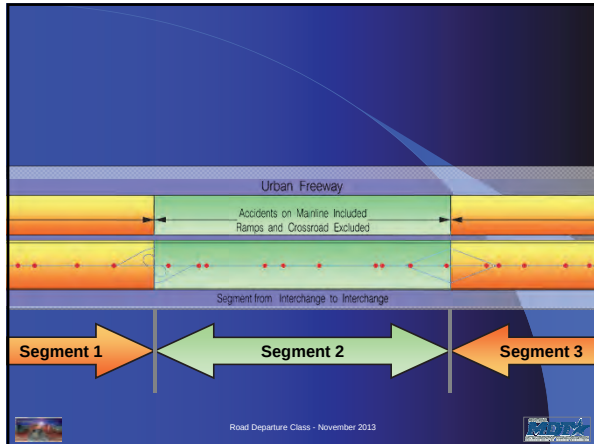
Included in PF Dataset

0.1 Miles

Intersection Related Accidents Studied using Intersection Diagnostic Analysis

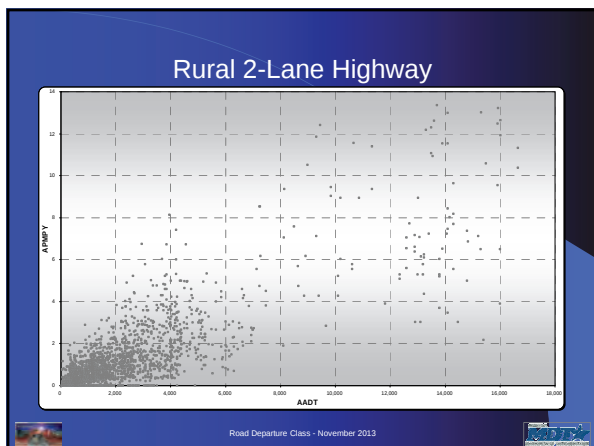
Intersection Related Accidents Studied using Intersection Diagnostic Analysis

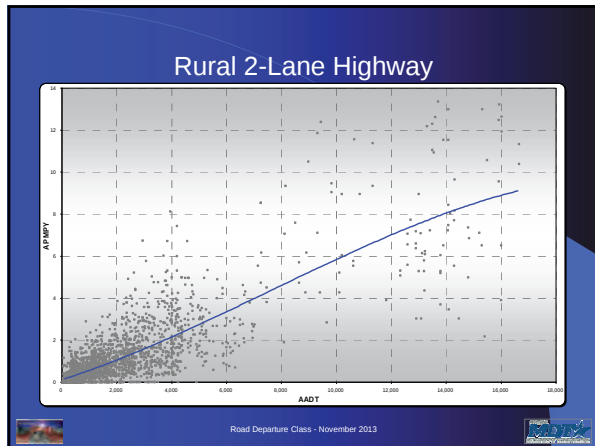
Road Departure Class - November 2013

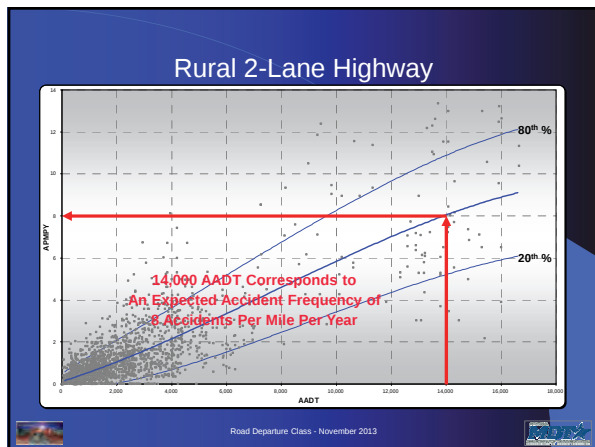


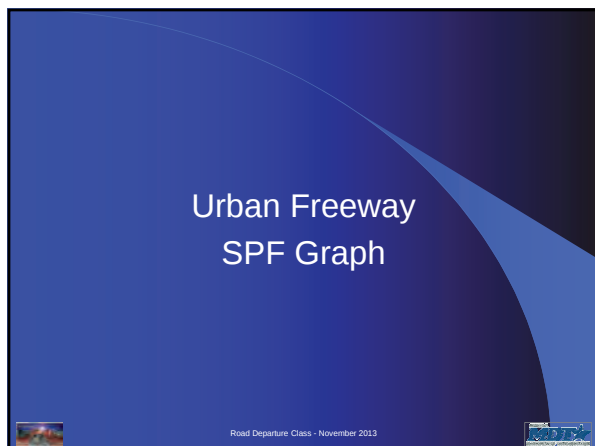
Rural Mountainous 2-Lane Highway LOSS/SPF Graph

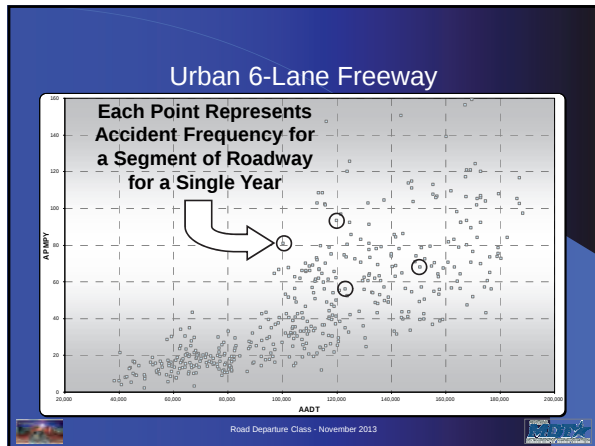
Road Departure Class - November 2013

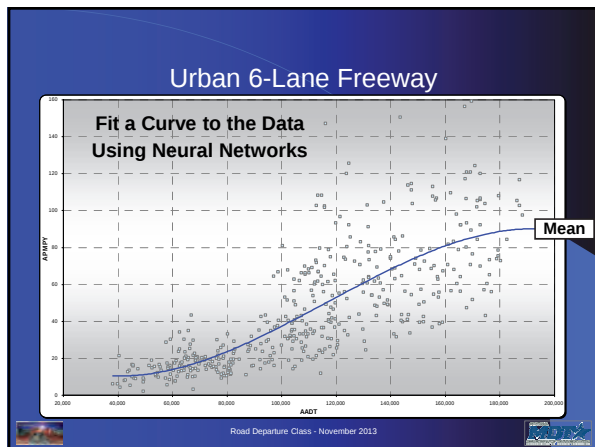


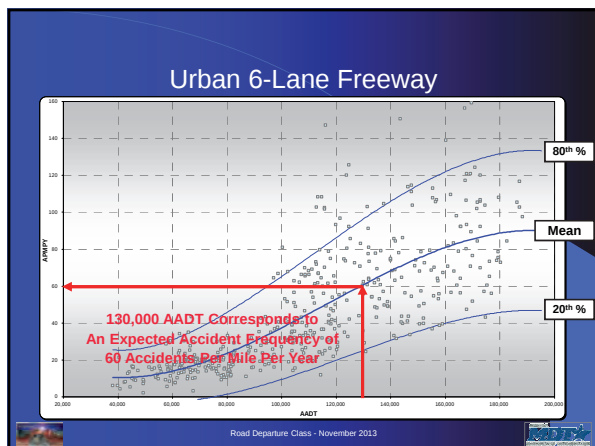


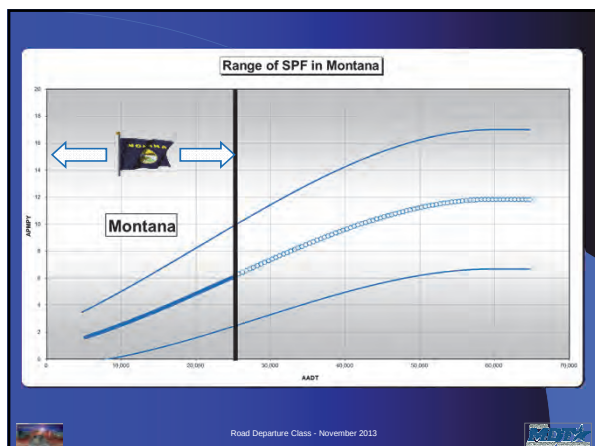












26 Year Old Male
164 Lbs

Blood Pressure
110 Systolic
65 Diastolic

Does he have High Blood Pressure?

Road Departure Class - November 2013

43 Year Old Male
264 Lbs

Blood Pressure
180 Systolic
100 Diastolic

Does he have High Blood Pressure?

Road Departure Class - November 2013



Does anyone here have Training in Internal Medicine or Cardiology?


Road Departure Class - November 2013


Interstate I-90 MP 315.00-317.00 (2 Miles)
 Rural 4-Lane Divided Freeway Full Shoulders
 Median Barrier And Guardrail
 AADT 12,950 VPD
 Crash History 14 Injury Crashes In 5 Years
 Is This A Safety Problem ?




Road Departure Class - November 2013







LOSS Analysis

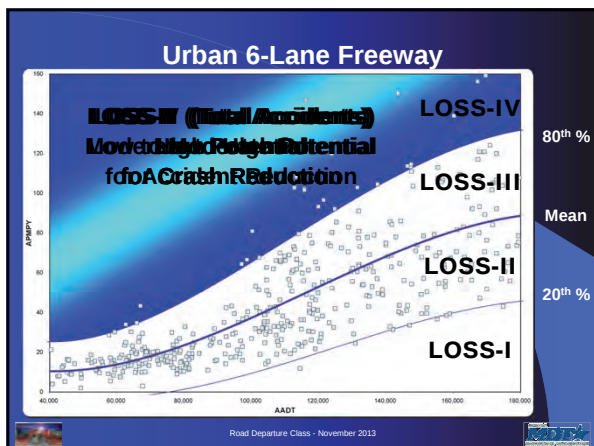
Jake Kononov, P.E. Ph.D.
Bryan K. Allery, P.E.

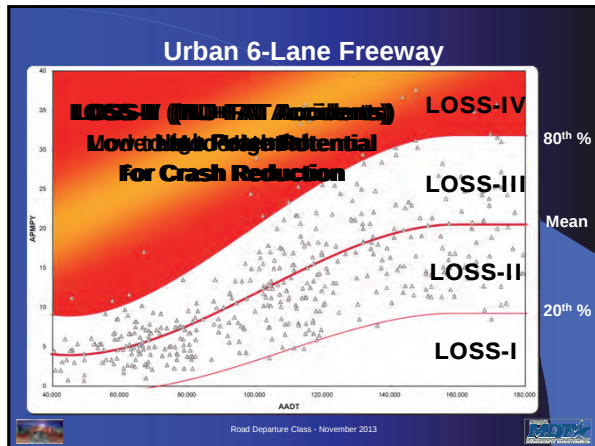
Road Departure Class - November 2013




Level of Service of Safety (LOSS) on Every Segment is Described from the Perspective of Both Frequency and Severity

Road Departure Class - November 2013





Why is Level of Service of Safety (LOSS) Concept Needed?

- Qualitatively and Quantitatively Describe the Degree of Safety or Un-Safety of a Roadway Segment
- Communicate the Magnitude of Safety Problem of a Roadway Segment to Other Professionals or Elected Officials

Road Departure Class - November 2013

Why is Level of Service of Safety (LOSS) Concept Needed?

- Bring Perception of Roadway Safety in Line with Reality of Safety Performance Reflecting a Specific Facility

Road Departure Class - November 2013

Why is Level of Service of Safety (LOSS) Concept Needed?

- Provide a Frame of Reference for Decision Making on Non-Safety Motivated Projects (Resurfacing or Reconstruction)



Road Departure Class - November 2013



Why is Level of Service of Safety (LOSS) Concept Needed?

- Provide a Frame of Reference from a Safety Perspective for Planning Corridor Improvements



Road Departure Class - November 2013





Correcting for Regression to the Mean Bias Using Empirical Bayes Method

Jake Kononov, P.E. Ph.D.
Bryan K. Allery, P.E.

Road Departure Class - November 2013

Regression to the Mean Phenomenon

The best guess about the future is usually obtained by computing the average of past events.

In road safety (as well as other disciplines) the precision of this estimate however can be improved upon by correcting it for the Regression To the Mean (RTM) bias.

RTM phenomenon reflects the tendency of random events such as vehicle crashes to move toward the average over time.

Road Departure Class - November 2013

Regression to the Mean Phenomenon

The RTM bias has been long recognized , and is now effectively addressed by using the Empirical Bayes (EB) method.

The EB method increases the precision of the estimation and corrects for the RTM bias.

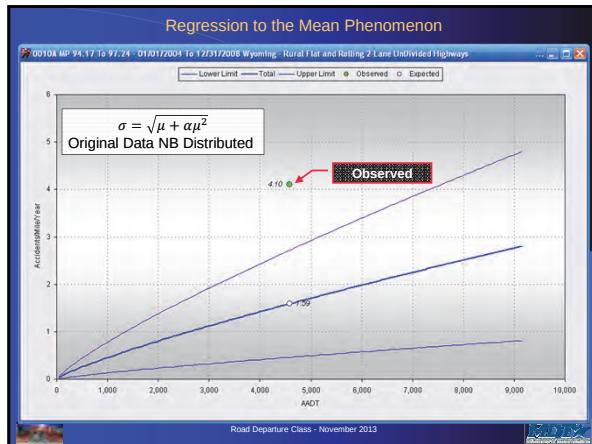
Road Departure Class - November 2013

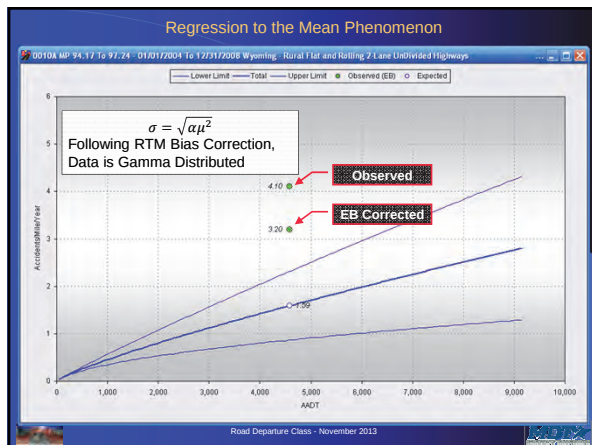
Regression to the Mean Phenomenon

10 Year Average

The figure is a scatter plot titled '10 Year Average'. The x-axis represents a numerical value ranging from 0 to 7,000 with major ticks every 1,000 units. The y-axis represents another numerical value ranging from 0.0 to 5.0 with major ticks every 0.5 units. The plot contains numerous blue square data points that are widely scattered, mostly concentrated between x=0 and x=4,000. A solid black line, representing a fitted model, starts near the origin and trends upwards with a positive slope, passing through approximately (6,000, 2.5). A legend in the top left corner of the plot area identifies the blue squares as 'aprioral' and the black line as 'A/PMPY (Total Eq)'.

Road Departure Class - November 2013





Regression to the Mean Phenomenon

The following example shows application of the EB method to the crash history on I-90 MP 82.30-83.70. In this case only injury and fatal crashes are examined.

Observed accident frequency η is 1.57 acc/mile per year

Expected frequency μ is 0.53 acc/mile per year predicted by the Inj+Fat SPF for Rural Flat and Rolling 4-Lane Freeways

EB correction parameter $\phi = 1.793$ estimated from the SPF

Number of years of crash history $n = 5$

Weight $(W) = \frac{1}{1 + (\mu \times n) / \phi} = \frac{1}{1 + (0.53 \times 5) / 1.793} = 0.404$

EB Corrected Estimate $= W \times \mu + (1-W) \times \eta = 0.404 \times 0.53 + (1.00 - 0.404) \times 1.57 = 1.15$ acc/mile per year

Road Departure Class - November 2013

[illegible]

APPLICATION OF METHODOLOGY

- System Level Planning and Program Development
- Corridor Level Planning (EA/EIS)
- Project Level Decision Support Analysis
- Supporting Research Papers and Information

[illegible]

HSM References	
<i>Current as of April 6, 2009</i>	
	<i>Highway Safety Manual – 1st Edition</i>
2356	4.5. REFERENCES
2357	1. Atkey, R. T. "Economic Level of Service of Safety in Transportation Research
2358	Board, No. 436, TRB, National Research Council, 2001, pp. 57-68
2359	2. Cornell, F. E. Zolotoraja, T. Miller, and B. Persaud. Crash Cost Estimation by
2360	Advanced Policy Related Injury Severity within Select Crash Geometries.
2361	FHWA HDT-05-011, Federal Highway Administration, U.S. Department of
2362	Transportation, October 2005.
2363	3. Hause, E. <i>Operational Before-After Studies in Road Safety</i>. Pergamon Press-
2364	Inc., Oxford, NY, 1997.
2365	4. Kennedy, T. <i>Urban Road Design and Future Scenarios</i>. Metropolitan
2366	Planning Council with "Prestar" for Accident Reduction, Transportation
2367	Research Board Annual Meeting (TRB-84-8), 1983.
2368	5. Kennedy, T. and R. Atkey. Transportation Research Board Level of Service of
2369	Safety: Conceptual Theoretical and Analytical Frameworks. In Transportation
2370	Research Board, (44) TRB, National Research Council, 2000, pp. 27-49.
2371	6. McWhirt Research Institute. White Paper for Module 1 - Network Screening.
2372	Federal Highway Administration, U.S. Department of Transportation, 2002.
2373	Available from: http://www.safetyanal.org/whtpayers
2374	7. Ogden, K.W. <i>Safety Roads: A Guide to Road Safety Engineering</i>. Ashgate,
2375	Brookfield, VT, 1996.
2376	
2377	
2378	

ROAD DEPARTURE

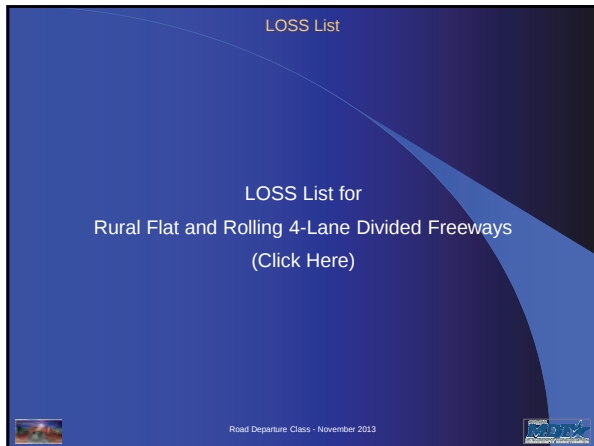
MDT
MISSISSIPPI DEPARTMENT OF TRANSPORTATION

System Level Planning and Program Development (SPF Based)

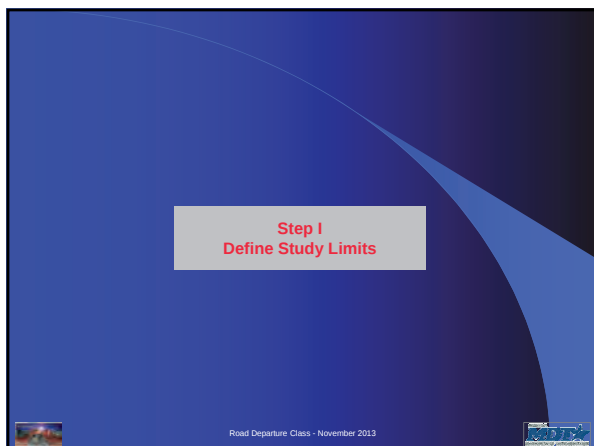
Jake Kononov, P.E. Ph.D.
Bryan K. Allery, P.E.

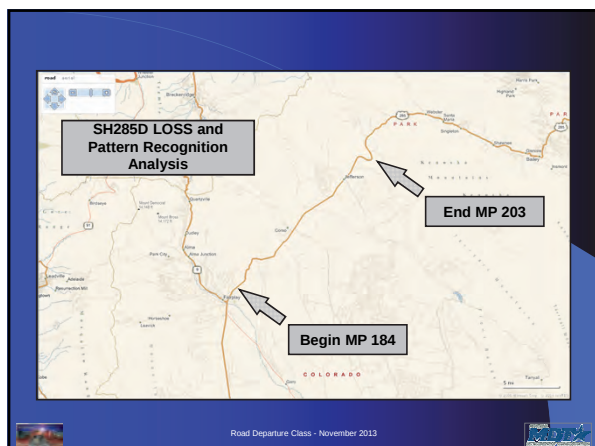
Road Departure Class - November 2013

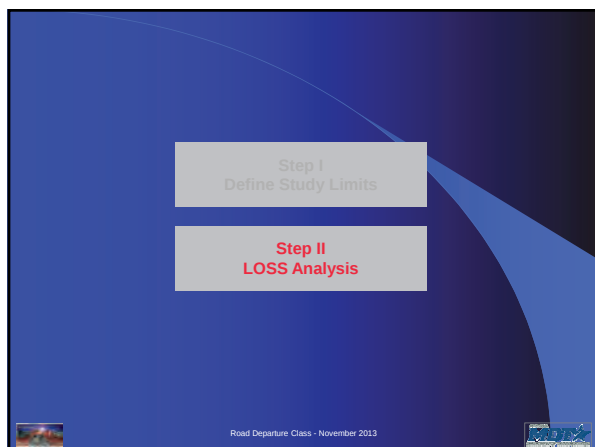
Locations with Potential for Accident Reduction												
May	Sec	Lat	Long	From	To	ADT	ADT	ADT	ADT	ADT	ADT	ADT
ADT	ADT	ADT	ADT	ADT	ADT	ADT	ADT	ADT	ADT	ADT	ADT	ADT
11A	72.40	18.50	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
11A	90.00	97.00	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
11A	110.00	110.00	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
11A	100.00	100.00	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
11A	30.15	42.64	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
11A	44.44	39.87	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
11A	83.25	48.55	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
11A	27.77	75.00	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
11A	52.05	46.00	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
11A	55.00	55.00	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
11A	106.28	110.42	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
11A	122.00	106.00	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
11A	34	51.1	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
11A	27.29	28.39	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
11A	53.37	53.37	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
11A	53.37	53.37	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
11A	46.42	46.42	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
11A	53.37	53.37	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
21A	52.99	52.99	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
21A	21.29	21.29	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
21A	11.73	28.11	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
21A	100.00	100.00	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
21A	100.00	113.32	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
21A	112.99	112.99	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
21A	154	182.07	123.4	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
21A	27.27	77.55	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
21A	33.28	27.51	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
21A	284.4	288.05	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
21A	42.82	42.82	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
21A	33.28	27.51	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
24A	17.61	22.11	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
24A	42.82	42.82	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
24A	50.47	54.85	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
24A	26.73	26.73	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
27A	12.23	14.37	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
27A	7.54	10.15	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
27A	12.23	14.37	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
27A	31.92	37.62	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
27A	10.00	4.00	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
27A	4.11	5.10	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
27A	17.77	17.77	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45
24A	11.76	12.58	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45	123.45

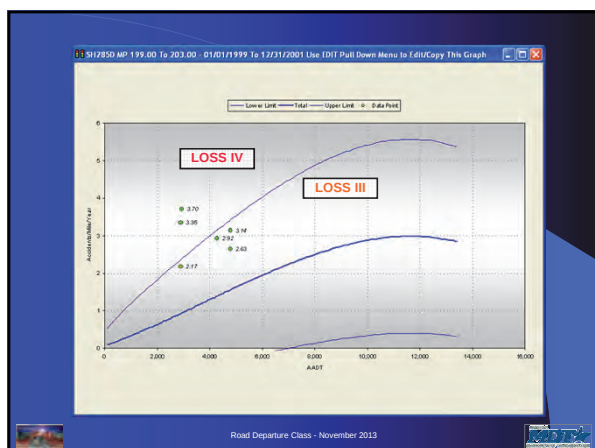


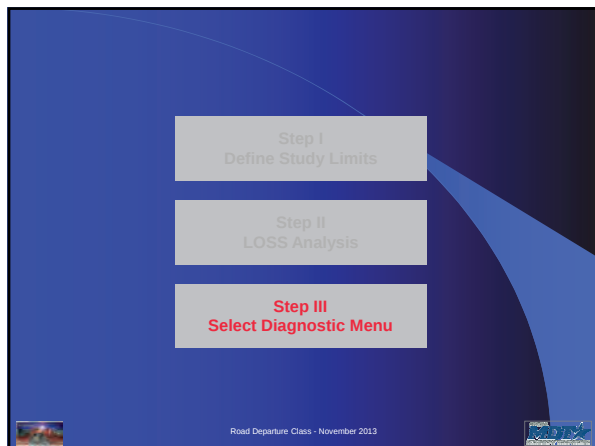


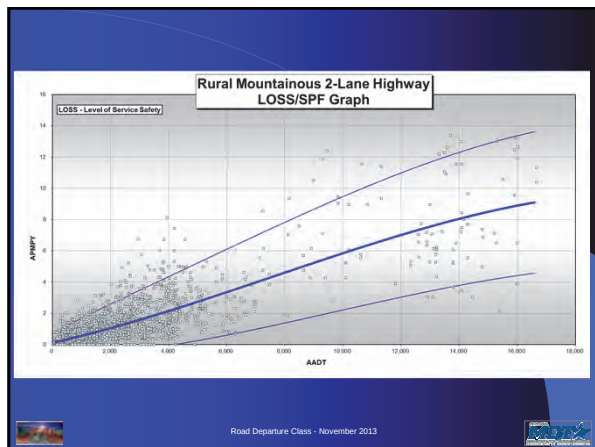


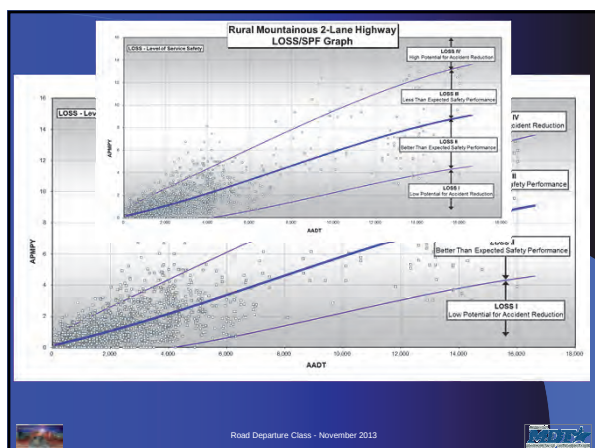


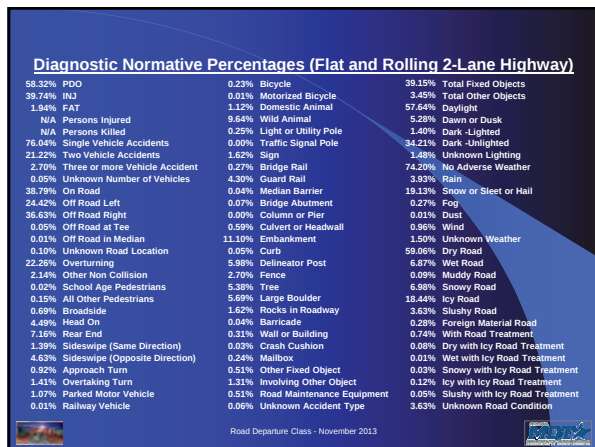
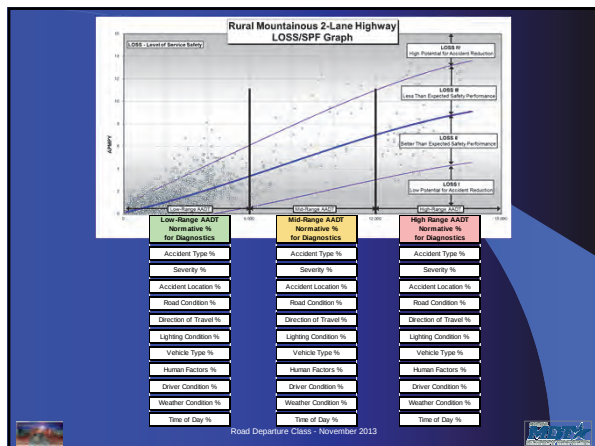






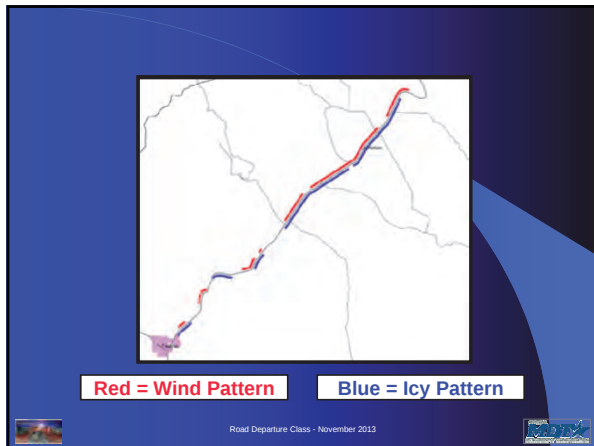


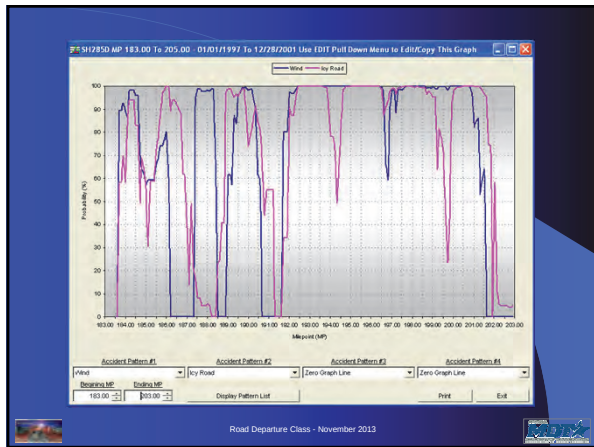




BLOOD TEST REFERENCE RANGE CHART	
Test	Reference Range (conventional units*)
17 Hydroxyprogesterone (Amen)	0.08-0.40 nmol/L
17 Hydroxyprogesterone (Women) Follicular phase	0.2-1.0 nmol/L
25-Hydroxyvitamin D (25(OH)D)	8-80 ng/mL
Acetoacetate	<3 mg/dL
Acidity (pH)	7.35 - 7.45
Alcohol	0 mg/dL, (more than 0.1 mg/dL, normally indicates intoxication) (ethanol)
Ammonia	15 - 50 µg of nitrogen/dL
Amylase	53 - 123 units/L
Ascorbic Acid	0.4 - 1.5 mg/dL
Bicarbonate	18 - 23 mEq/L (carbon dioxide content)
Bilirubin	Direct: up to 0.4 mg/dL Total: up to 1.0 mg/dL
Blood Volume	8.5 - 9.1% of total body weight
Calcium	8.2 - 10.6 mg/dL (normally slightly higher in children)
Carbon Dioxide Pressure	35 - 45 mm Hg
Carbon Monoxide	Less than 5% of total hemoglobin
CD4 Cell Count	500 - 1500 cells/µL
Ceruloplasmin	15 - 60 mg/dL
Chloride	98 - 106 mEq/L
Complete Blood Cell Count (CBC)	Includes hemoglobin, hematocrit, mean corpuscular hemoglobin, mean corpuscular hemoglobin concentration, mean corpuscular volume, platelet count, white blood cell count.
Copper	Total: 70 - 150 µg/dL
Creatine Kinase (CK or CPK)	Male: 38 - 174 units/L Female: 36 - 140 units/L
Creatine Kinase Isoenzymes	5% MB or less
Creatinine	0.6 - 1.2 mg/dL
Erythrocyte Sedimentation Rate (ESR or Sed-Rate)	Test includes: calcium, chloride, magnesium, potassium, sodium. Males: < 15 mm/hr Females: < 20 mm/hr
Glucose	Tested after fasting: 70 - 110 mg/dL

Round Deputations Class - November 2013



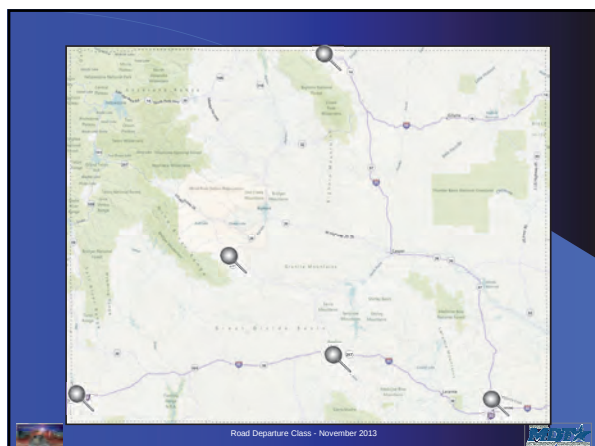





System Level Planning and Program Development (Pattern Recognition Based)

Jake Kononov, P.E. Ph.D.
Bryan K. Allery, P.E.

Road Departure Class - November 2013



DIExSys™ Safety Systems
Pattern List by Location

10/16/2013

Location File: 1237_000000_000000_000000_000000_SUMMARY

Location	MP	From	To	Crash	TA	CS
Location: SH0012A	MP: 27.00 to 28.00	From: 01/01/1999	To: 12/31/2008	300	21	21
Severity: PROPERTY DAMAGE ONLY (POD) [21]						
Road Condition: RY ROAD [0]						
Contributing Factor: DRIVER 1 - NO APPARENT CONTRIBUTING FACTOR [14]						
Location: SH0012A	MP: 27.75 to 28.75	From: 01/01/1999	To: 12/31/2008	300	12	21
Crash Type: OVERTURNING [0]						
Weather: NO ADVERSE WEATHER [0]						
Location: SH0012A	MP: 28.00 to 29.00	From: 01/01/1999	To: 12/31/2008	300	22	21
Location: UNKNOWN ROAD LOSS [22]						
Crash Type: OVERTURNING [19]						
Location: SH0012A	MP: 28.25 to 29.25	From: 01/01/1999	To: 12/31/2008	300	19	21
Crash Type: OVERTURNING [11]						
Location: SH0012A	MP: 28.50 to 29.50	From: 01/01/1999	To: 12/31/2008	300	20	21
Crash Type: OVERTURNING [12]						
Location: SH0012A	MP: 28.75 to 29.75	From: 01/01/1999	To: 12/31/2008	300	21	21

Road Departure Class - November 2013

Level of Service of Safety (LOSS)
and
Pattern Recognition Analysis

Example #2
State Highway 74

Jake Kononov, P.E. Ph.D.
Bryan K. Allery, P.E.

Road Departure Class - November 2013

Step I
Define Study Limits

Road Departure Class - November 2013

SH074A LOSS and
Pattern Recognition
Analysis

Begin MP 8

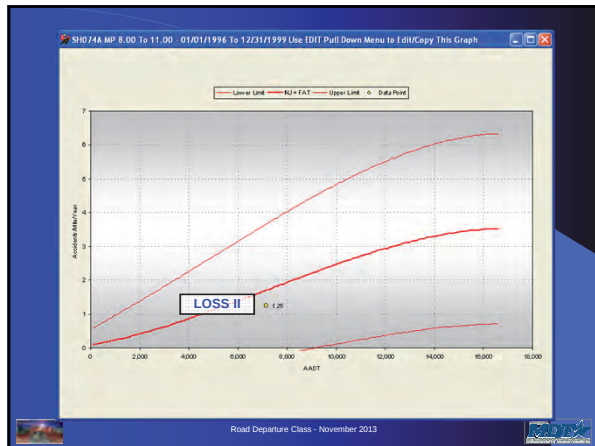
End MP 11

Road Departure Class - November 2013

Step I
Define Study Limits

Step II
LOSS Analysis

Road Departure Class - November 2013

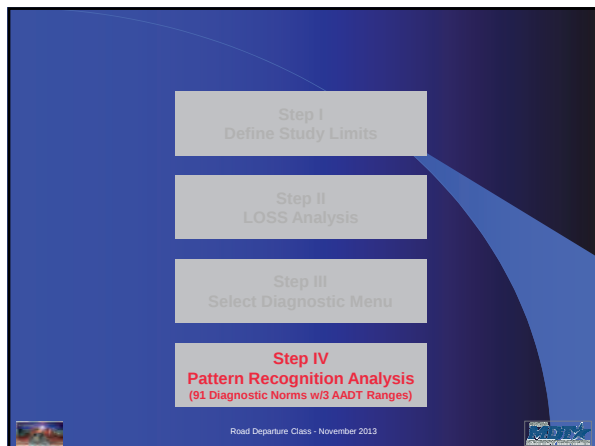


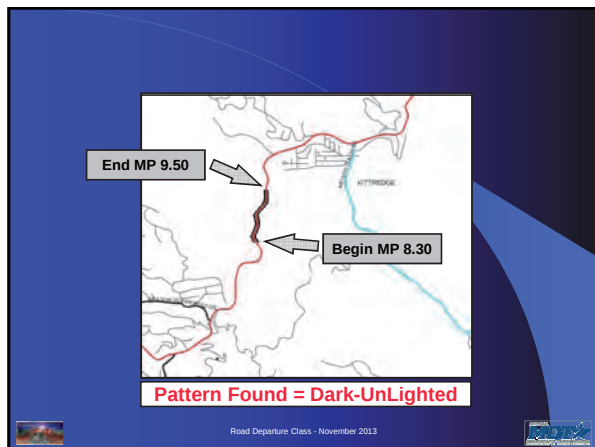


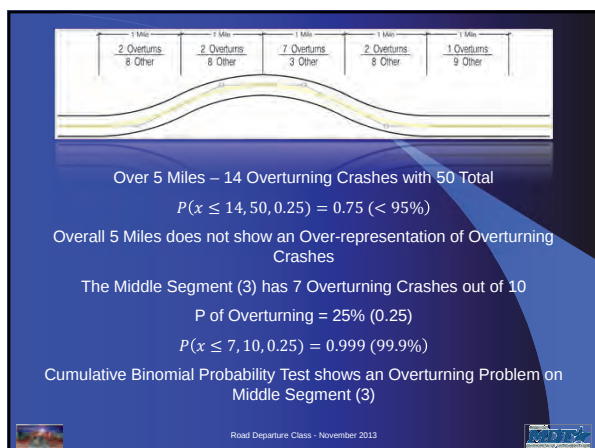
Diagnostic Normative Percentages (Rural Mountainous 2-Lane Highway)

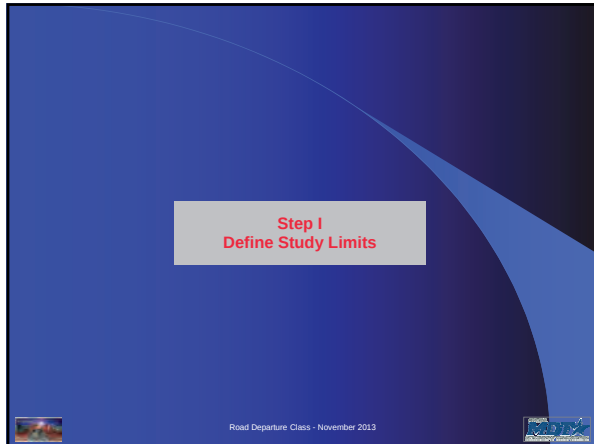
58.32% PDO	0.23% Bicycle	39.15% Total Fixed Objects
39.74% INJ	0.01% Motorized Bicycle	3.45% Total Other Objects
1.94% FAT	1.12% Domestic Animal	57.64% Daylight
N/A Persons Injured	9.64% Wild Animal	5.28% Dawn or Dusk
N/A Persons Killed	0.25% Light or Utility Pole	1.40% Dark - Lighted
76.04% Single Vehicle Accidents	0.00% Traffic Signal Pole	34.21% Dark - Unlighted
21.22% Two Vehicle Accidents	1.62% Sign	3.40% Unknown Lighting
2.70% Three or more Vehicle Accident	0.27% Bridge Rail	74.20% No Adverse Weather
0.05% Unknown Number of Vehicles	4.30% Guard Rail	3.93% Rain
38.79% On Road	0.04% Median Barrier	13.13% Snow or Sleet or Hall
24.42% Off Road Left	0.07% Bridge Abutment	0.22% Fog
36.63% Off Road Right	0.00% Column or Pier	0.01% Dust
0.05% Off Road at Tee	0.59% Culvert or Headwall	0.96% Wind
0.01% Off Road in Median	11.10% Embankment	1.50% Unknown Weather
0.10% Unknown Road Location	0.05% Curb	58.00% Dry Road
22.26% Overtaking	5.98% Delineator Post	6.87% Wet Road
2.14% Other Non Collision	2.70% Fence	0.09% Muddy Road
0.02% School Age Pedestrians	5.30% Tree	6.98% Snowy Road
0.15% All Other Pedestrians	5.69% Large Boulder	18.44% Icy Road
0.69% Broadside	1.62% Rocks in Roadway	3.63% Slushy Road
4.49% Head On	0.04% Barricade	0.28% Foreign Material Road
7.16% Rear End	0.31% Wall or Building	0.74% With Road Treatment
1.32% Sideswipe (Same Direction)	0.03% Crash Cushion	0.08% Dry with Icy Road Treatment
4.63% Sideswipe (Opposite Direction)	0.24% Mailbox	0.01% Wet with Icy Road Treatment
0.92% Approach Turn	0.51% Other Fixed Object	0.03% Snowy with Icy Road Treatment
1.41% Overtaking Turn	1.31% Involving Other Object	0.12% Icy with Icy Road Treatment
1.07% Parked Motor Vehicle	0.51% Road Maintenance Equipment	0.05% Slushy with Icy Road Treatment
0.01% Railway Vehicle	0.06% Unknown Accident Type	3.63% Unknown Road Condition

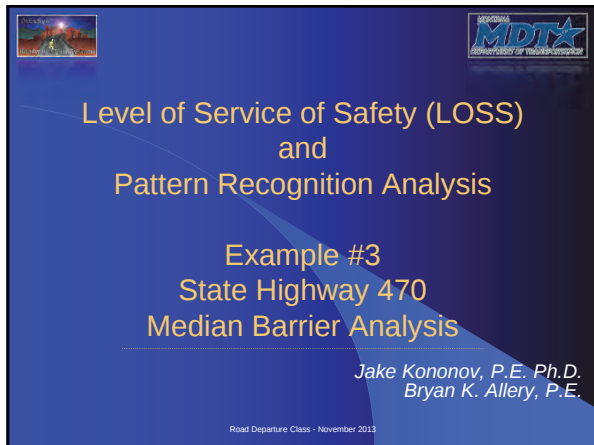
Road Departure Class - November 2013

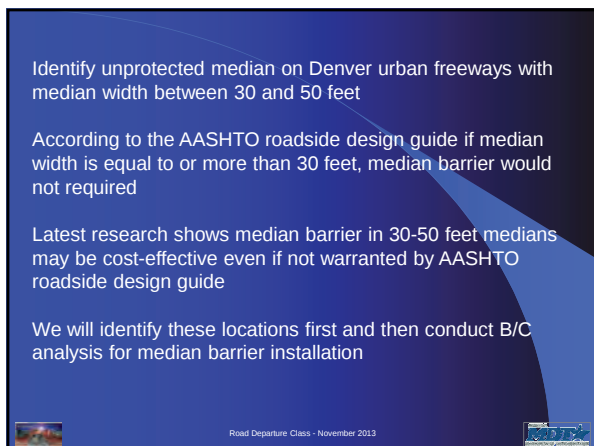


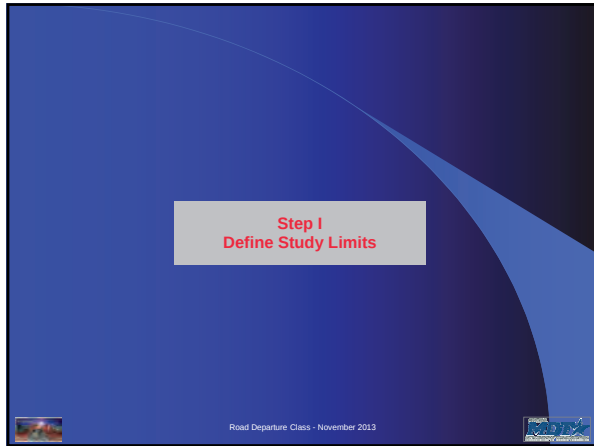


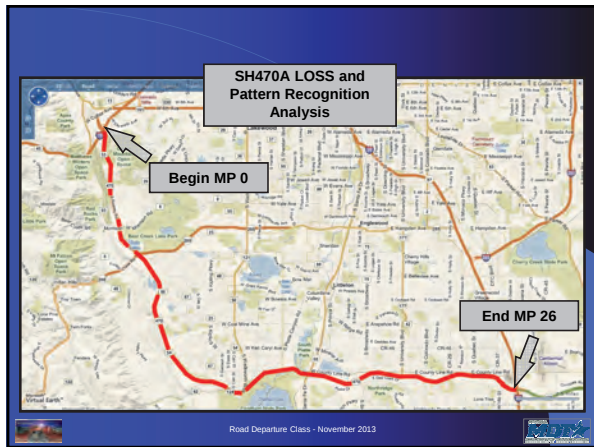


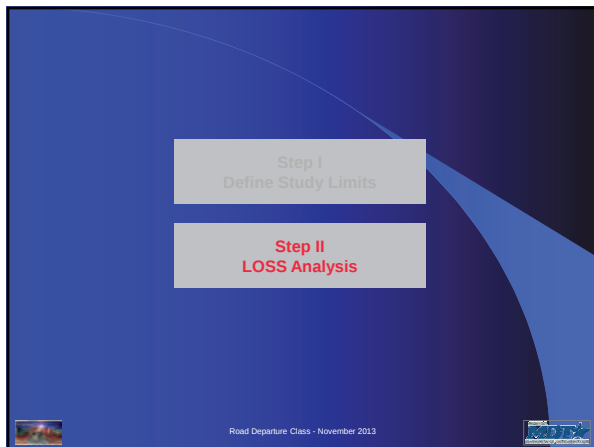


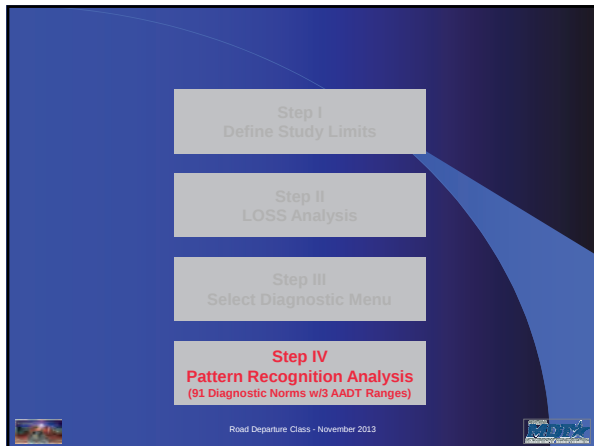


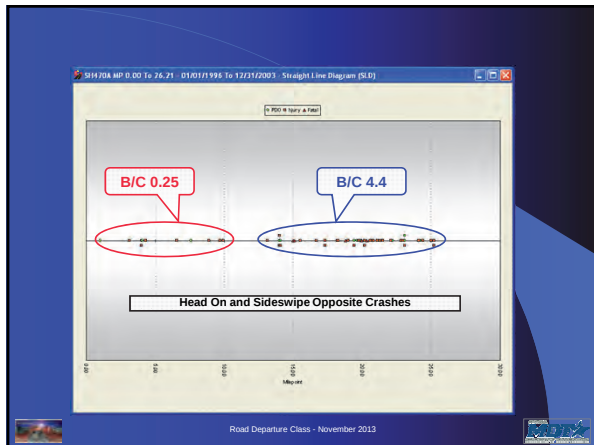








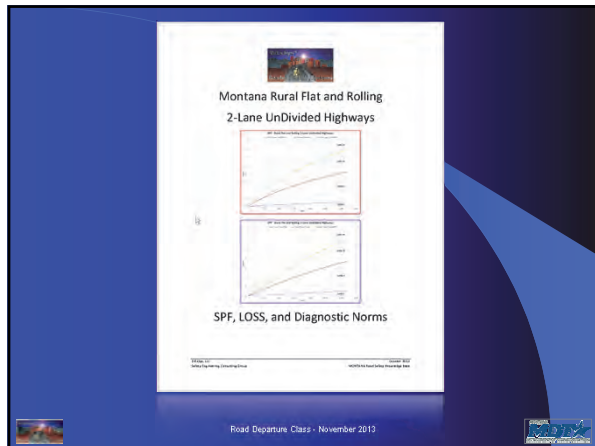


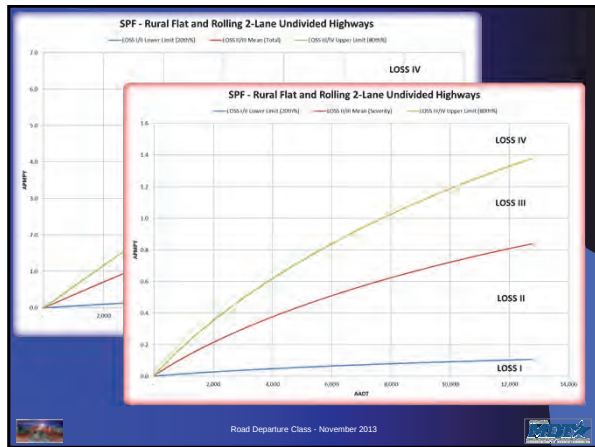


Montana Knowledge Base

Jake Kononov, P.E. Ph.D.
Bryan K. Allery, P.E.

Road Departure Class - November 2013





Model: **SPF - Rural Flat and Rolling 2-Lane Undivided Highways**

Dispersion (Alpha) = 1.46746E+00

AADT	LOSS, LB Lower Limit (2010/10)	LOSS, B/TB Means (2010/10)	LOSS, UB/UV Upper Limit (2010/10)
25	0.0003	0.0005	0.0011
50	0.0008	0.0010	0.0016
100	0.0016	0.0019	0.0029
200	0.0027	0.0031	0.0047
300	0.0036	0.0042	0.0062
400	0.0043	0.0052	0.0075
500	0.0049	0.0060	0.0085
600	0.0054	0.0066	0.0093
700	0.0058	0.0071	0.0099
800	0.0062	0.0075	0.0104
900	0.0065	0.0078	0.0108
1,000	0.0068	0.0081	0.0111
1,100	0.0071	0.0084	0.0114
1,200	0.0073	0.0086	0.0116
1,300	0.0075	0.0088	0.0118
1,400	0.0077	0.0090	0.0120
1,500	0.0079	0.0092	0.0122
1,600	0.0081	0.0094	0.0124
1,700	0.0083	0.0096	0.0126
1,800	0.0085	0.0098	0.0128
1,900	0.0087	0.0100	0.0130
2,000	0.0089	0.0102	0.0132
2,100	0.0091	0.0104	0.0134
2,200	0.0093	0.0106	0.0136
2,300	0.0095	0.0108	0.0138
2,400	0.0097	0.0110	0.0140
2,500	0.0099	0.0112	0.0142
2,600	0.0101	0.0114	0.0144
2,700	0.0103	0.0116	0.0146
2,800	0.0105	0.0118	0.0148
2,900	0.0107	0.0120	0.0150
3,000	0.0109	0.0122	0.0152
3,100	0.0111	0.0124	0.0154
3,200	0.0113	0.0126	0.0156
3,300	0.0115	0.0128	0.0158
3,400	0.0117	0.0130	0.0160
3,500	0.0119	0.0132	0.0162
3,600	0.0121	0.0134	0.0164
3,700	0.0123	0.0136	0.0166
3,800	0.0125	0.0138	0.0168
3,900	0.0127	0.0140	0.0170
4,000	0.0129	0.0142	0.0172
4,100	0.0131	0.0144	0.0174
4,200	0.0133	0.0146	0.0176
4,300	0.0135	0.0148	0.0178
4,400	0.0137	0.0150	0.0180
4,500	0.0139	0.0152	0.0182
4,600	0.0141	0.0154	0.0184
4,700	0.0143	0.0156	0.0186
4,800	0.0145	0.0158	0.0188
4,900	0.0147	0.0160	0.0190
5,000	0.0149	0.0162	0.0192
5,100	0.0151	0.0164	0.0194
5,200	0.0153	0.0166	0.0196
5,300	0.0155	0.0168	0.0198
5,400	0.0157	0.0170	0.0200
5,500	0.0159	0.0172	0.0202
5,600	0.0161	0.0174	0.0204
5,700	0.0163	0.0176	0.0206
5,800	0.0165	0.0178	0.0208
5,900	0.0167	0.0180	0.0210
6,000	0.0169	0.0182	0.0212
6,100	0.0171	0.0184	0.0214
6,200	0.0173	0.0186	0.0216
6,300	0.0175	0.0188	0.0218
6,400	0.0177	0.0190	0.0220
6,500	0.0179	0.0192	0.0222
6,600	0.0181	0.0194	0.0224
6,700	0.0183	0.0196	0.0226
6,800	0.0185	0.0198	0.0228
6,900	0.0187	0.0200	0.0230
7,000	0.0189	0.0202	0.0232
7,100	0.0191	0.0204	0.0234
7,200	0.0193	0.0206	0.0236
7,300	0.0195	0.0208	0.0238
7,400	0.0197	0.0210	0.0240
7,500	0.0199	0.0212	0.0242
7,600	0.0201	0.0214	0.0244
7,700	0.0203	0.0216	0.0246
7,800	0.0205	0.0218	0.0248
7,900	0.0207	0.0220	0.0250
8,000	0.0209	0.0222	0.0252
8,100	0.0211	0.0224	0.0254
8,200	0.0213	0.0226	0.0256
8,300	0.0215	0.0228	0.0258
8,400	0.0217	0.0230	0.0260
8,500	0.0219	0.0232	0.0262
8,600	0.0221	0.0234	0.0264
8,700	0.0223	0.0236	0.0266
8,800	0.0225	0.0238	0.0268
8,900	0.0227	0.0240	0.0270
9,000	0.0229	0.0242	0.0272
9,100	0.0231	0.0244	0.0274
9,200	0.0233	0.0246	0.0276
9,300	0.0235	0.0248	0.0278
9,400	0.0237	0.0250	0.0280
9,500	0.0239	0.0252	0.0282
9,600	0.0241	0.0254	0.0284
9,700	0.0243	0.0256	0.0286
9,800	0.0245	0.0258	0.0288
9,900	0.0247	0.0260	0.0290
10,000	0.0249	0.0262	0.0292

Road Departure Class - November 2013

Oklahoma State Highway 412J
MP 0.50 to 5.80



Road Departure Class - November 2013



Oklahoma State Highway 412
MP 0.50 to 5.80



Road Departure Class - November 2013

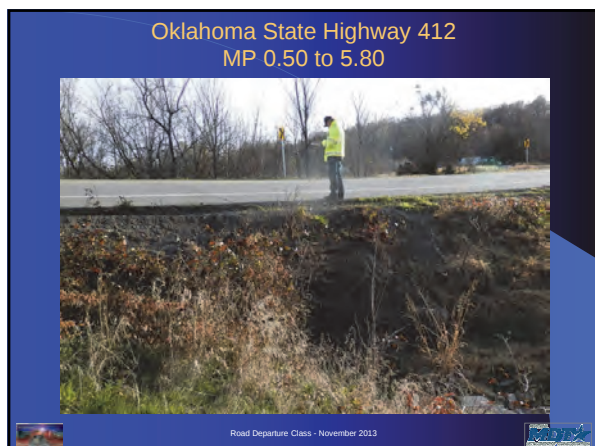


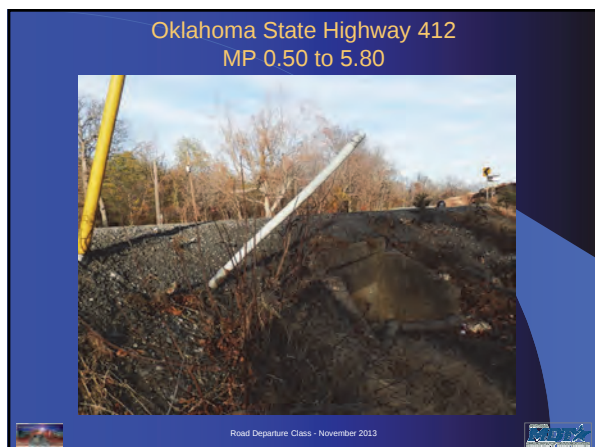
Oklahoma State Highway 412
MP 0.50 to 5.80

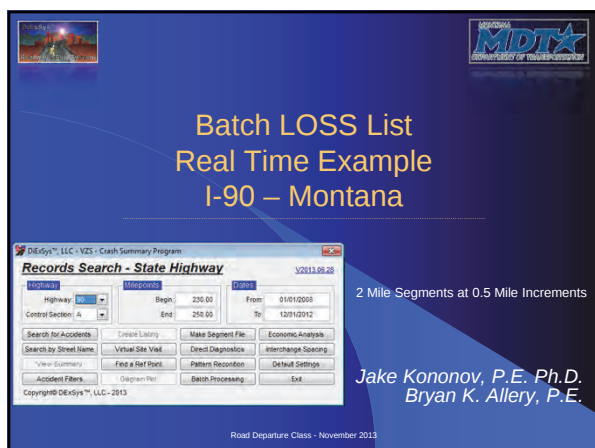


Road Departure Class - November 2013

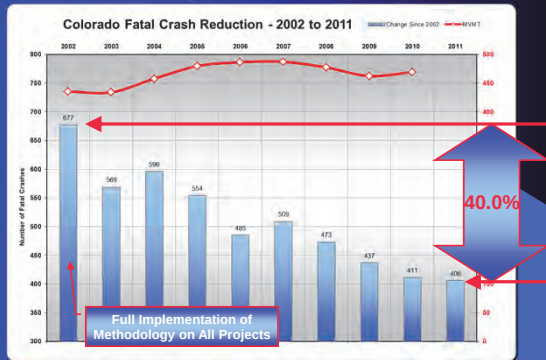




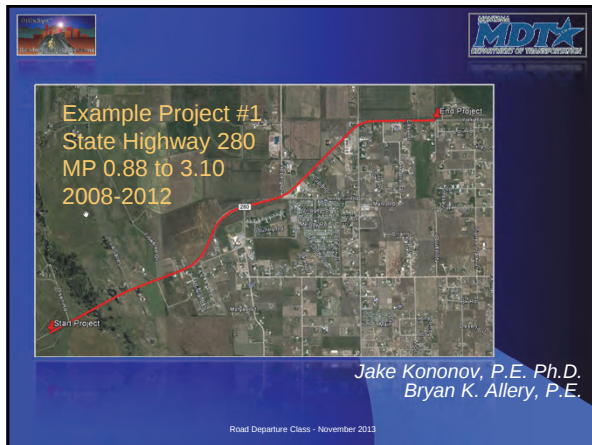




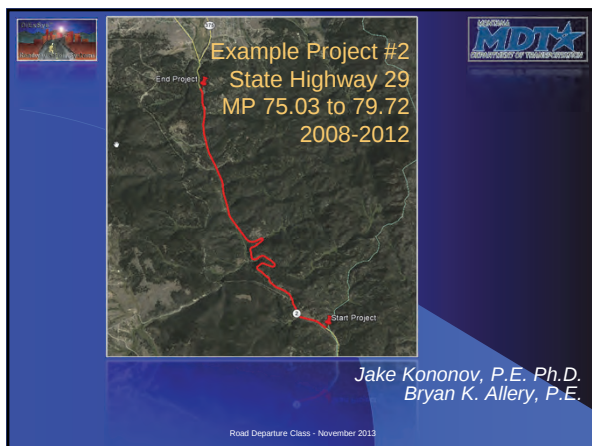
Has this Approach been Effective?



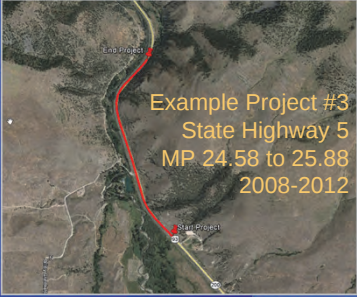
Road Departure Class - November 2013



Road Departure Class - November 2013



Road Departure Class - November 2013

Example Project #3

State Highway 5

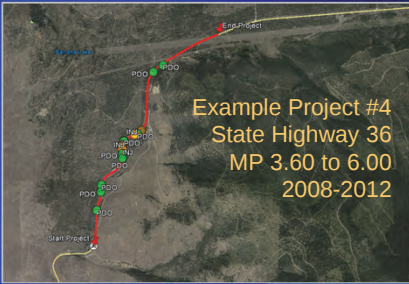
MP 24.58 to 25.88

2008-2012

Jake Kononov, P.E. Ph.D.

Bryan K. Allery, P.E.

Road Departure Class - November 2013

Example Project #4

State Highway 36

MP 3.60 to 6.00

2008-2012

Jake Kononov, P.E. Ph.D.

Bryan K. Allery, P.E.

Road Departure Class - November 2013




Roadway Departure Workshop

Data Driven Approach to Solving
Run Off the Road Safety Problems

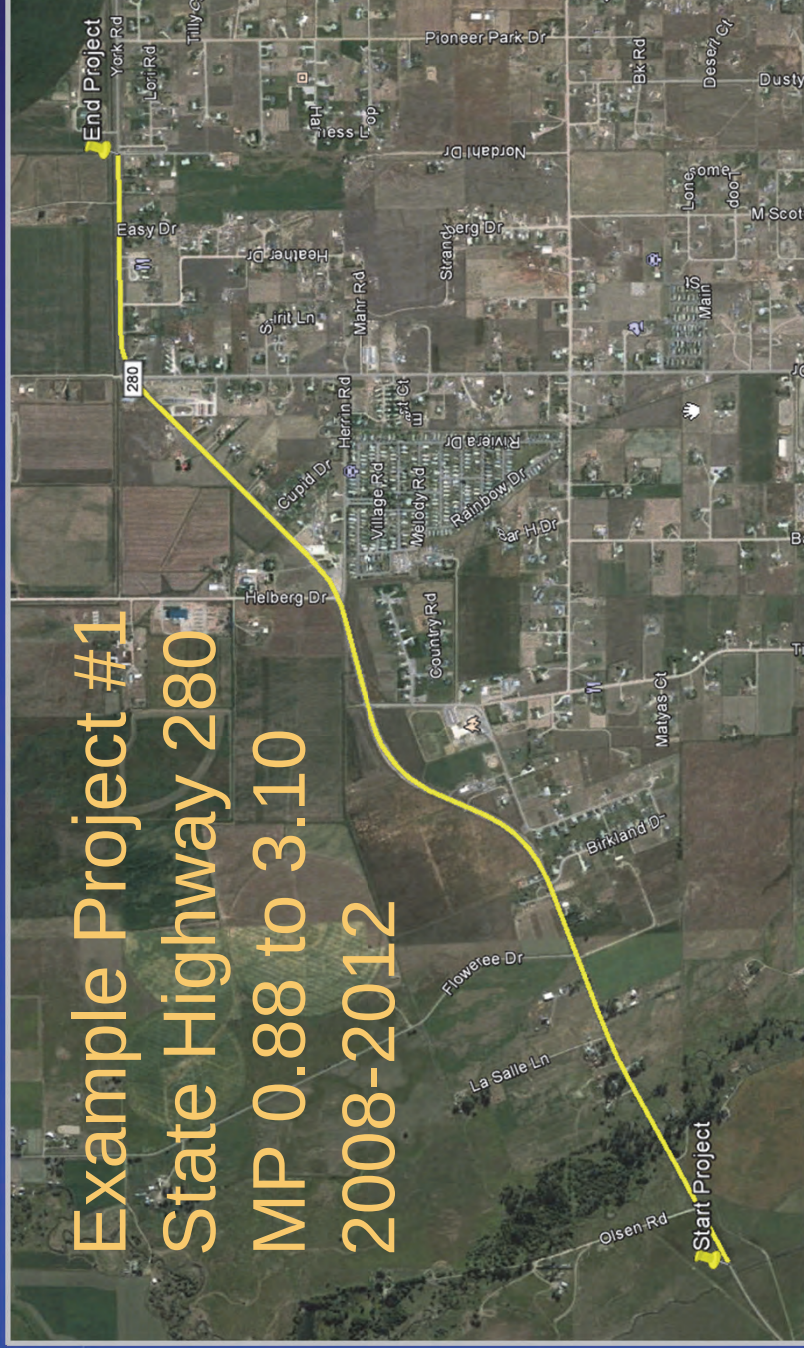
Jake Kononov, P.E. Ph.D.

Bryan K. Allery, P.E.

Road Departure Class - November 2013



Example Project #1 State Highway 280 MP 0.88 to 3.10 2008-2012



Jake Kononov, P.E. Ph.D.
Bryan K. Allery, P.E.

hwy	mp	date	time	severity	location	road_desc	acctype	driver_1
0280A	0.90	2/6/2008	2045	PDO	OFF LEFT	NON-INTERSECTION	FENCE	ALCOHOL
0280A	0.94	9/22/2011	0300	INJ	ON	NON-INTERSECTION	INVOLVING OTHER OBJECT	ALCOHOL
0280A	0.99	8/17/2009	2120	PDO	UNKNOWN	NON-INTERSECTION	WILD ANIMAL	NO IMPAIRMENT
0280A	1.00	6/8/2008	0130	PDO	OFF RIGHT	NON-INTERSECTION	FENCE	NO IMPAIRMENT
0280A	1.03	12/16/2009	0725	PDO	OFF RIGHT	NON-INTERSECTION	FENCE	NO IMPAIRMENT
0280A	1.04	2/23/2012	0900	PDO	ON	NON-INTERSECTION	FENCE	NO IMPAIRMENT
0280A	1.09	10/13/2011	1530	PDO	ON	NON-INTERSECTION	FENCE	NO IMPAIRMENT
0280A	1.20	6/28/2009	0258	PDO	UNKNOWN	NON-INTERSECTION	EMBANKMENT CUT/FILL SLOPE	ALCOHOL
0280A	1.25	10/18/2012	1530	INJ	OFF RIGHT	NON-INTERSECTION	LIGHT/UTILITY POLE	NO IMPAIRMENT
0280A	1.28	5/28/2012	0001	INJ	ON	NON-INTERSECTION	OVERTURNING	ALCOHOL
0280A	1.30	7/26/2008	1950	INJ	ON	NON-INTERSECTION	OVERTURNING	ALCOHOL
0280A	1.31	11/12/2012	1220	PDO	OFF RIGHT	NON-INTERSECTION	OTHER FIXED OBJECT	NO IMPAIRMENT
0280A	1.32	11/17/2012	0700	PDO	OFF RIGHT	NON-INTERSECTION	FENCE	NO IMPAIRMENT
0280A	1.33	10/18/2012	1810	PDO	ON	NON-INTERSECTION	REAR-END	NO IMPAIRMENT
0280A	1.37	10/5/2008	0415	PDO	UNKNOWN	NON-INTERSECTION	INVOLVING OTHER OBJECT	NO IMPAIRMENT
0280A	1.37	12/5/2010	1730	PDO	ON	NON-INTERSECTION	DOMESTIC ANIMAL	NO IMPAIRMENT
0280A	1.37	9/14/2011	1201	PDO	ON	NON-INTERSECTION	WILD ANIMAL	NO IMPAIRMENT
0280A	1.40	1/17/2008	1855	PDO	OFF RIGHT	NON-INTERSECTION	GUARD RAIL	ALCOHOL
0280A	1.51	10/23/2012	0814	INJ	OFF LEFT	NON-INTERSECTION	OVERTURNING	NO IMPAIRMENT
0280A	1.55	2/5/2009	0630	PDO	UNKNOWN	NON-INTERSECTION	FENCE	NO IMPAIRMENT
0280A	1.65	5/19/2010	0820	PDO	ON	NON-INTERSECTION	REAR-END	NO IMPAIRMENT
0280A	1.66	1/13/2011	0705	PDO	ON	NON-INTERSECTION	REAR-END	NO IMPAIRMENT
0280A	1.76	6/29/2009	1740	PDO	UNKNOWN	NON-INTERSECTION	REAR-END	NO IMPAIRMENT
0280A	1.76	12/21/2008	0100	PDO	UNKNOWN	NON-INTERSECTION	EMBANKMENT CUT/FILL SLOPE	ALCOHOL
0280A	1.90	10/28/2009	2003	INJ	ON	NON-INTERSECTION	BROADSIDE	NO IMPAIRMENT
0280A	1.91	10/13/2009	1905	PDO	ON	NON-INTERSECTION	BROADSIDE	NO IMPAIRMENT
0280A	1.94	1/29/2010	0036	PDO	ON	NON-INTERSECTION	WILD ANIMAL	NO IMPAIRMENT
0280A	2.41	10/12/2008	1140	INJ	UNKNOWN	NON-INTERSECTION	OVERTURNING	NO IMPAIRMENT
0280A	2.50	7/18/2011	1900	INJ	ON	NON-INTERSECTION	EMBANKMENT CUT/FILL SLOPE	NO IMPAIRMENT
0280A	2.50	12/5/2009	0915	PDO	OFF LEFT	NON-INTERSECTION	FENCE	NO IMPAIRMENT
0280A	2.53	4/29/2009	0702	PDO	UNKNOWN	NON-INTERSECTION	OVERTURNING	NO IMPAIRMENT
0280A	2.57	12/27/2010	0930	PDO	OFF LEFT	NON-INTERSECTION	EMBANKMENT CUT/FILL SLOPE	NO IMPAIRMENT
0280A	2.60	10/1/2009	1225	PDO	ON	NON-INTERSECTION	SIGN	NO IMPAIRMENT
0280A	2.60	7/20/2008	0255	INJ	OFF RIGHT	NON-INTERSECTION	EMBANKMENT CUT/FILL SLOPE	ALCOHOL
0280A	2.63	11/14/2011	1846	PDO	OFF LEFT	NON-INTERSECTION	LIGHT/UTILITY POLE	NO IMPAIRMENT
0280A	2.70	12/4/2011	0130	PDO	OFF LEFT	NON-INTERSECTION	EMBANKMENT CUT/FILL SLOPE	ALCOHOL
0280A	2.80	12/27/2008	1640	INJ	UNKNOWN	NON-INTERSECTION	INVOLVING OTHER OBJECT	NO IMPAIRMENT
0280A	3.00	11/30/2011	1600	PDO	ON	NON-INTERSECTION	FENCE	NO IMPAIRMENT
0280A	3.00	4/24/2008	1649	PDO	ON	NON-INTERSECTION	UNKNOWN	NO IMPAIRMENT
0280A	3.02	6/26/2009	1135	INJ	UNKNOWN	NON-INTERSECTION	OVERTURNING	NO IMPAIRMENT

SH280A					
From:	0.88	Length:	2.22	From:	1/1/2008
To:	3.10	AADT:	4,508	To:	12/31/2012

Dispersion Parameter (α) RFRR2UH		
Inj:		1.462
Total:		1.435

Weight

$$W = \frac{1}{1 + \frac{(\mu \times n)}{\phi}}$$

$$\phi = 1/\alpha$$

EB Estimate

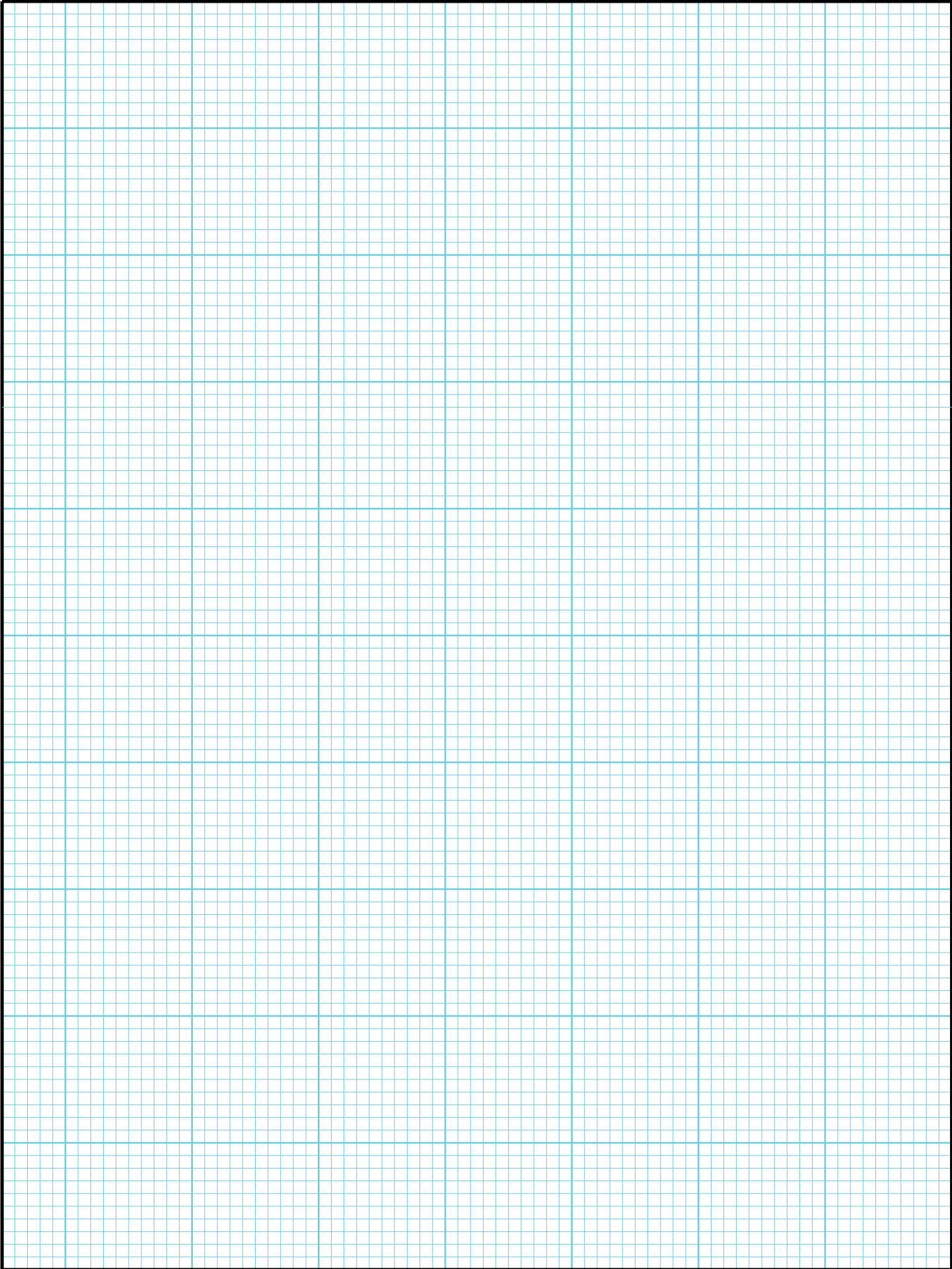
$$EB_{Est} = W \times \mu + (1 - W) \times \eta$$

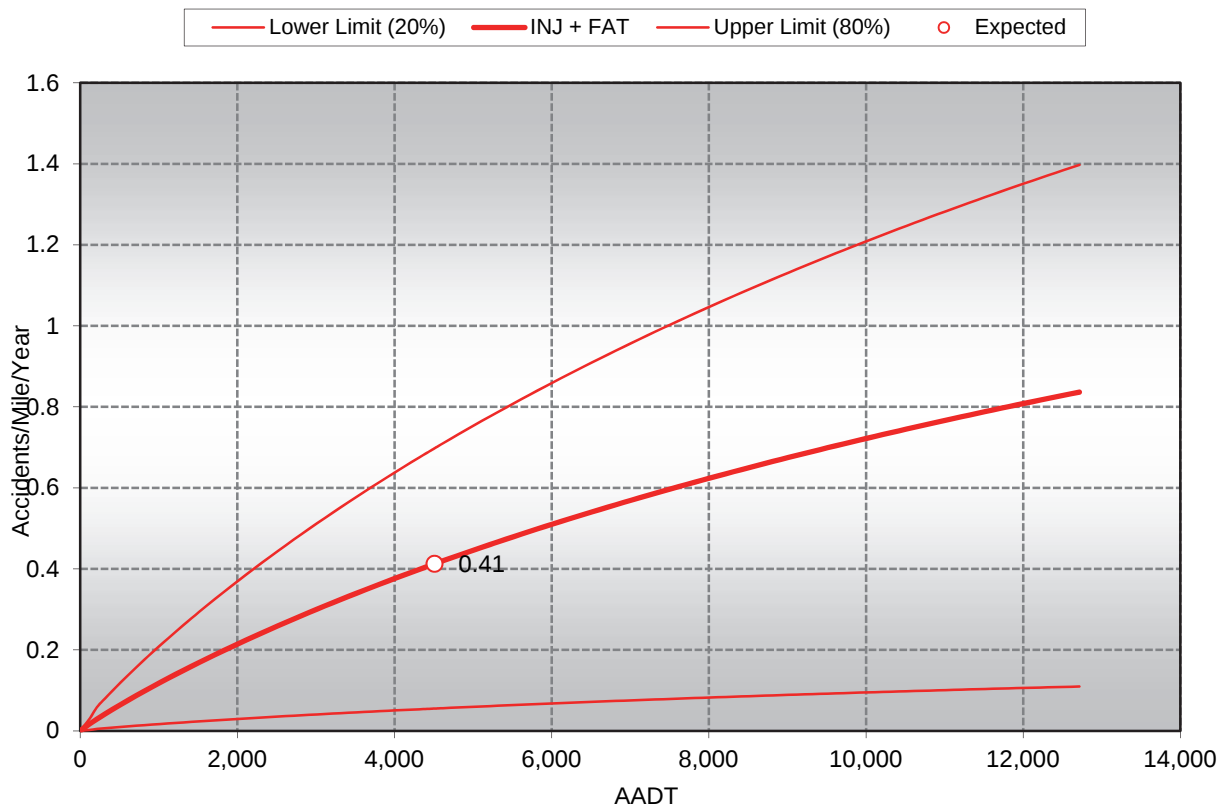
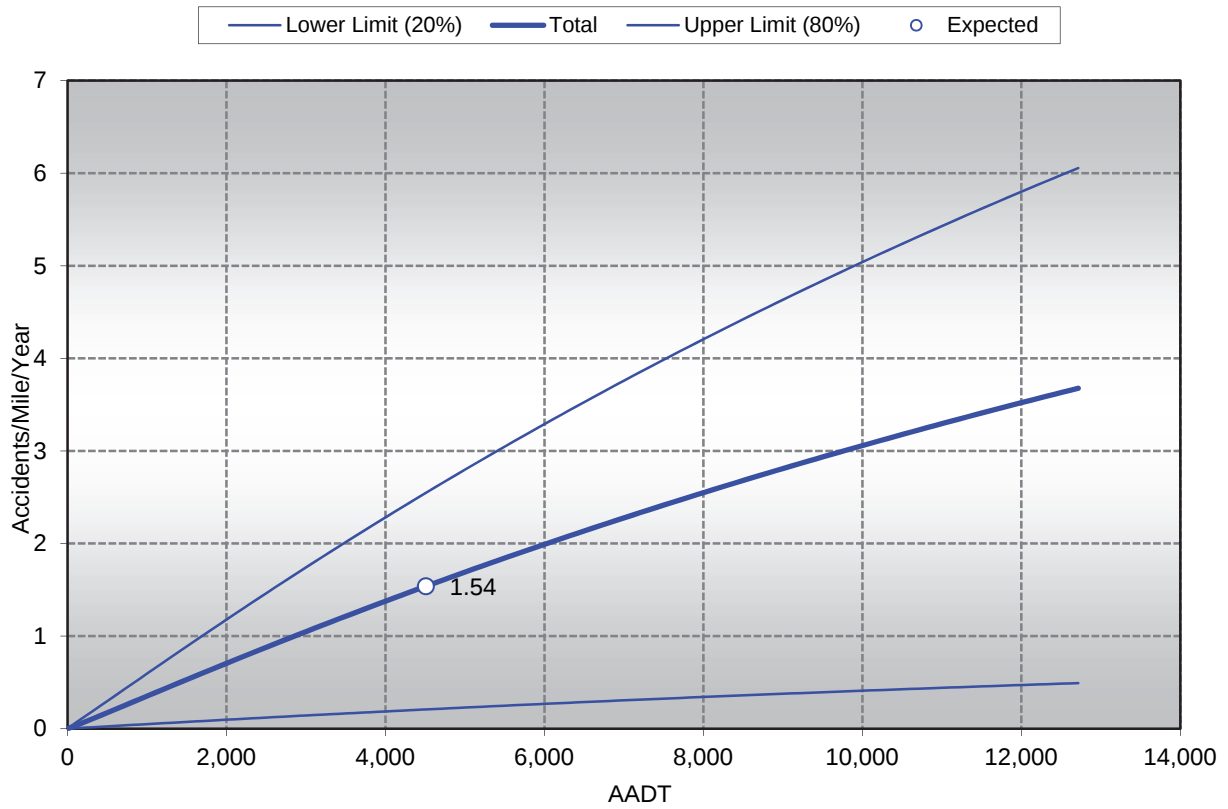
μ = Predicted by SPF

η = Number of Observed Crashes/Mile/Year

α = Dispersion Parameter from SPF Model

$$\phi = 1/\alpha$$





Montana Rural Flat and Rolling 2-Lane Undivided Highways								
Description	0 - 3000 ADT		3000 - 8000 ADT		> 8000 ADT		All Totals	
	Accidents	Percent	Accidents	Percent	Accidents	Percent	Accidents	Percent
Severity								
PDO	6,951	66.96%	2,320	73.14%	470	76.42%	9,741	68.75%
INJ	3,157	30.41%	798	25.16%	140	22.76%	4,095	28.90%
FAT	273	2.63%	54	1.70%	5	0.81%	332	2.34%
Persons Injured	4,585	N/A	1,124	N/A	214	N/A	5,923	N/A
Persons Killed	307	N/A	62	N/A	6	N/A	375	N/A
Number of Vehicles								
Single Vehicle Accidents	9,079	87.46%	2,487	78.40%	388	63.09%	11,954	84.37%
Two Vehicle Accidents	1,217	11.72%	622	19.61%	194	31.54%	2,033	14.35%
Three or more Vehicle Accident	85	0.82%	63	1.99%	33	5.37%	181	1.28%
Unknown Number of Vehicles	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Location								
On Road	5,524	53.21%	1,947	61.38%	427	69.43%	7,898	55.75%
Off Road	3,041	29.29%	671	21.15%	82	13.33%	3,794	26.78%
Off Road Left	1,275	12.28%	242	7.63%	31	5.04%	1,548	10.93%
Off Road Right	1,766	17.01%	429	13.52%	51	8.29%	2,246	15.85%
Off Road at Tee	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Off Road in Median	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Unknown Road Location	1,816	17.49%	554	17.47%	106	17.24%	2,476	17.48%
Accident Type								
Overturning	2,968	28.59%	490	15.45%	53	8.62%	3,511	24.78%
Other Non Collision	337	3.25%	98	3.09%	8	1.30%	443	3.13%
School Age Pedestrians	0	0.00%	0	0.00%	0	0.00%	0	0.00%
All Other Pedestrians	18	0.17%	9	0.28%	0	0.00%	27	0.19%
Broadside	152	1.46%	82	2.59%	21	3.41%	255	1.80%
Head On	135	1.30%	71	2.24%	15	2.44%	221	1.56%
Rear End	396	3.81%	281	8.86%	135	21.95%	812	5.73%
Sideswipe (Same Direction)	191	1.84%	53	1.67%	14	2.28%	258	1.82%
Sideswipe (Opposite Direction)	241	2.32%	95	2.99%	20	3.25%	356	2.51%
Approach Turn	7	0.07%	7	0.22%	4	0.65%	18	0.13%
Overtaking Turn	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Parked Motor Vehicle	29	0.28%	12	0.38%	2	0.33%	43	0.30%
Railway Vehicle	4	0.04%	1	0.03%	0	0.00%	5	0.04%
Bicycle	2	0.02%	1	0.03%	0	0.00%	3	0.02%
Motorized Bicycle	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Domestic Animal	468	4.51%	55	1.73%	5	0.81%	528	3.73%
Wild Animal	2,653	25.56%	1,127	35.53%	229	37.24%	4,009	28.30%
Light or Utility Pole	88	0.85%	46	1.45%	7	1.14%	141	1.00%
Traffic Signal Pole	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Sign	67	0.65%	21	0.66%	3	0.49%	91	0.64%
Bridge Rail	44	0.42%	10	0.32%	3	0.49%	57	0.40%
Guard Rail	472	4.55%	126	3.97%	9	1.46%	607	4.28%
Cable Rail	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Median Barrier	38	0.37%	3	0.09%	4	0.65%	45	0.32%
Bridge Abutment	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Column or Pier	14	0.13%	6	0.19%	14	2.28%	22	0.16%
Culvert or Headwall	52	0.50%	10	0.32%	3	0.49%	65	0.46%
Embankment	897	8.64%	229	7.22%	26	4.23%	1,152	8.13%
Curb	4	0.04%	0	0.00%	0	0.00%	4	0.03%
Delineator Post	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Fence	352	3.39%	89	2.81%	13	2.11%	454	3.20%
Tree	257	2.48%	80	2.52%	9	1.46%	346	2.44%
Large Boulder	45	0.43%	12	0.38%	0	0.00%	57	0.40%
Rocks in Roadway	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Barricade	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Wall or Building	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Crash Cushion	5	0.05%	2	0.06%	1	0.16%	8	0.06%
Mailbox	22	0.21%	13	0.41%	3	0.49%	38	0.27%
Other Fixed Object	204	1.97%	42	1.32%	11	1.79%	257	1.81%
Involving Other Object	87	0.84%	60	1.89%	4	0.65%	151	1.07%
Road Maintenance Equipment	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Unknown Accident Type	132	1.27%	41	1.29%	11	1.79%	184	1.30%
Total Fixed Objects	2,561	24.67%	689	21.72%	94	15.28%	3,344	23.60%
Total Other Objects	87	0.84%	60	1.89%	4	0.65%	151	1.07%

Montana Rural Flat and Rolling 2-Lane Undivided Highways								
Description	0 - 3000 ADT		3000 - 8000 ADT		> 8000 ADT		All Totals	
	Accidents	Percent	Accidents	Percent	Accidents	Percent	Accidents	Percent
Lighting								
Daylight	5,500	52.98%	1,539	48.52%	315	51.22%	7,354	51.91%
Dawn or Dusk	730	7.03%	208	6.56%	47	7.64%	985	6.95%
Dark - Lighted	108	1.04%	58	1.83%	16	2.60%	182	1.28%
Dark - Unlighted	4,018	38.71%	1,359	42.84%	236	38.37%	5,613	39.62%
Unknown Lighting	25	0.24%	8	0.25%	1	0.16%	34	0.24%
Weather								
No Adverse Weather	8,446	81.36%	2,595	81.81%	516	83.90%	11,557	81.57%
Rain	361	3.48%	112	3.53%	24	3.90%	497	3.51%
Snow or Sleet or Hail	1,312	12.64%	404	12.74%	68	11.06%	1,784	12.59%
Fog	115	1.11%	31	0.98%	5	0.81%	151	1.07%
Dust	3	0.03%	0	0.00%	0	0.00%	3	0.02%
Wind	117	1.13%	17	0.54%	2	0.33%	136	0.96%
Unknown Weather	27	0.26%	13	0.41%	0	0.00%	40	0.28%
Road Condition								
Dry Road	7,062	68.03%	2,128	67.09%	418	67.97%	9,608	67.81%
Wet Road	742	7.15%	294	9.27%	68	11.06%	1,104	7.79%
Muddy Road	11	0.11%	2	0.06%	3	0.49%	16	0.11%
Snowy Road	1,078	10.38%	333	10.50%	44	7.15%	1,455	10.27%
Icy Road	1,330	12.81%	393	12.39%	80	13.01%	1,803	12.73%
Slushy Road	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Foreign Material Road	0	0.00%	1	0.03%	0	0.00%	1	0.01%
With Road Treatment	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Dry with Icy Road Treatment	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Wet with Icy Road Treatment	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Snowy with Icy Road Treatment	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Icy with Icy Road Treatment	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Slushy with Icy Road Treatment	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Unknown Road Condition	158	1.52%	21	0.66%	2	0.33%	181	1.28%
Contributing Factor								
No Apparent Contributing Factor	1,768	17.03%	699	22.04%	137	22.28%	2,604	18.38%
Asleep at the Wheel	284	2.74%	65	2.05%	4	0.65%	353	2.49%
Illness	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Distracted by Passenger	2	0.02%	1	0.03%	2	0.33%	5	0.04%
Driver Inexperience	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Driver Fatigue	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Driver Preoccupied	528	5.09%	129	4.07%	34	5.53%	691	4.88%
Driver Unfamiliar with Area	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Driver Emotionally Upset	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Evading Law Enforcement Officer	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Physical Disability	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Unknown Contributing Factor	7,799	75.13%	2,278	71.82%	438	71.22%	10,515	74.22%
Condition of Driver								
No Impairment Suspected	8,646	83.29%	2,724	85.88%	568	92.36%	11,938	84.26%
Alcohol Involved	1,070	10.31%	278	8.76%	37	6.02%	1,385	9.78%
RX Drugs or Medication Involved	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Illegal Drugs Involved	65	0.63%	35	1.10%	1	0.16%	101	0.71%
Alcohol and Drugs Involved	184	1.77%	48	1.51%	5	0.81%	237	1.67%
Driver/Pedestrian Not Observed	52	0.50%	12	0.38%	0	0.00%	64	0.45%
Unknown Condition	364	3.51%	75	2.36%	4	0.65%	443	3.13%
Total Accidents:	10,381	73.27%	3,172	22.39%	615	4.34%	14,168	100.00%



Montana Department of Transportation
DiExSys™ Roadway Safety Systems
Detailed Accident Summary Report

10/27/2013

Job #: 20131027124011

Location: 280A Begin: 0.88 End: 3.10 From:01/01/2008 To:12/31/2012

Severity

PDO: 29
INJ: 11 15 :Injured
FAT: 0 0 :Killed

Total: 40

Number of Vehicles

One Vehicle: 33
Two Vehicles: 6
Three or More: 1
Unknown: 0

Total: 40

Location

On Road: 17
Off Road Left: 6
Off Road Right: 7
Off Road at Tee: 0
Off in Median: 0
Unknown: 10

Total: 40

Lighting Conditions

Daylight: 23
Dawn or Dusk: 1
Dark - Lighted: 1
Dark - Unlighted: 15
Unknown: 0

Total: 40

Weather Conditions

None: 30
Rain: 2
Snow/Sleet/Hail: 8
Fog: 0
Dust: 0
Wind: 0
Unknown: 0

Total: 40

Accident Rates

PDO: 1.59 * * MVMT
INJ: 0.60 * ** 100 MVMT
FAT: 0.00 ** **Total: 2.19 ***

Accident Type

Overturning:	6	Bridge Abutment:	0
Other Non Collision:	0	Column/Pier:	0
Pedestrians:	0	Culvert/Headwall:	0
Broadside:	2	Embankment:	6
Head On:	0	Curb:	0
Rear End:	4	Delineator Post:	0
Sideswipe (Same):	0	Fence:	9
Sideswipe (Opposite):	0	Tree:	0
Approach Turn:	0	Large Boulders or Rocks:	0
Overtaking Turn:	0	Barricade:	0
Parked Motor Vehicle:	0	Wall/Building:	0
Railway Vehicle:	0	Crash Cushion:	0
Bicycle:	0	Mailbox:	0
Motorized Bicycle:	0	Other Fixed Object:	1
Domestic Animal:	1	Total Fixed Objects:	20
Wild Animal:	3	Rocks in Roadway:	0
Light/Utility Pole:	2	Vehicle Cargo/Debris:	0
Traffic Signal Pole:	0	Road Maintenance Equipment:	0
Sign:	1	Involving Other Object:	3
Bridge Rail:	0	Total Other Objects:	3
Guard Rail:	1	Unknown:	1
Cable Rail:	0	Total:	40
Concrete Barrier:	0		

Mainline/Ramps/Frontage Roads

Mainline: 40
Crossroad (A): 0

Frontage/Ramp Intersections

M: 0 N: 0 O: 0 P: 0

Ramps

B: 0 F: 0 J: 0
C: 0 G: 0 K: 0
D: 0 H: 0 L: 0
E: 0 I: 0

Left Frontage Rd (L): 0
Rt Frontage Rd (R): 0
HOV Lanes (V): 0
Unknown: 0

Total: 40

Road Description

At Intersection: 0
At Driveway Access: 0
Intersection Related: 0
Non Intersection: 40
In Alley: 0
Roundabout: 0
Ramp: 0
Parking Lot: 0
Unknown: 0

Total: 40

Road Conditions

Dry: 21
Wet: 7
Muddy: 0
Snowy: 5
Icy: 7
Slushy: 0
Foreign Material: 0
With Road Treatment: 0
Dry w/Icy Road Treatment: 0
Wet w/Icy Road Treatment: 0
Snowy w/Icy Road Treatment: 0
Icy w/Icy Road Treatment: 0
Slushy w/Icy Road Treatment: 0
Unknown: 0

Total: 40

ADT: 4,508 Length: 2.22



Montana Department of Transportation
DiExSys™ Roadway Safety Systems
Detailed Accident Summary Report

10/27/2013

Job #: 20131027124011

Location: 280A Begin: 0.88 End: 3.10 From: 01/01/2008 To: 12/31/2012

Vehicle Type	Veh 1	Veh 2	Veh 3	Vehicle Movement	Veh 1	Veh 2	Veh 3
Passenger Car/Van:	24	2	0	Going Straight:	35	5	1
Passenger Car/Van w/Trl:	0	0	0	Slowing:	0	0	0
Pickup Truck/Utility Van:	10	2	1	Stopped in Traffic:	1	1	0
Pickup Truck/Utility Van w/Trl:	0	0	0	Making Right Turn:	1	0	0
Truck 10k lbs or Less:	0	0	0	Making Left Turn:	0	0	0
Trucks > 10k lbs/Bus > 15 People:	0	0	0	Making U-Turn:	0	0	0
School Bus < 15 People:	0	0	0	Passing:	0	0	0
Non School Bus < 15 People:	0	0	0	Backing:	1	0	0
Motorhome:	0	0	0	Enter/Leave Parked Position:	0	0	0
Motorcycle:	1	0	0	Starting in Traffic:	0	0	0
Bicycle:	0	0	0	Parked:	1	0	0
Motorized Bicycle:	0	0	0	Changing Lanes:	0	0	0
Farm Equipment:	0	0	0	Avoiding Object/Veh in Road:	0	0	0
Hit and Run - Unknown:	0	0	0	Weaving:	0	0	0
Other:	0	1	0	Other:	1	0	0
Unknown:	0	1	0	Unknown:	0	1	0
Total:	40	7	1	Total:	40	7	1

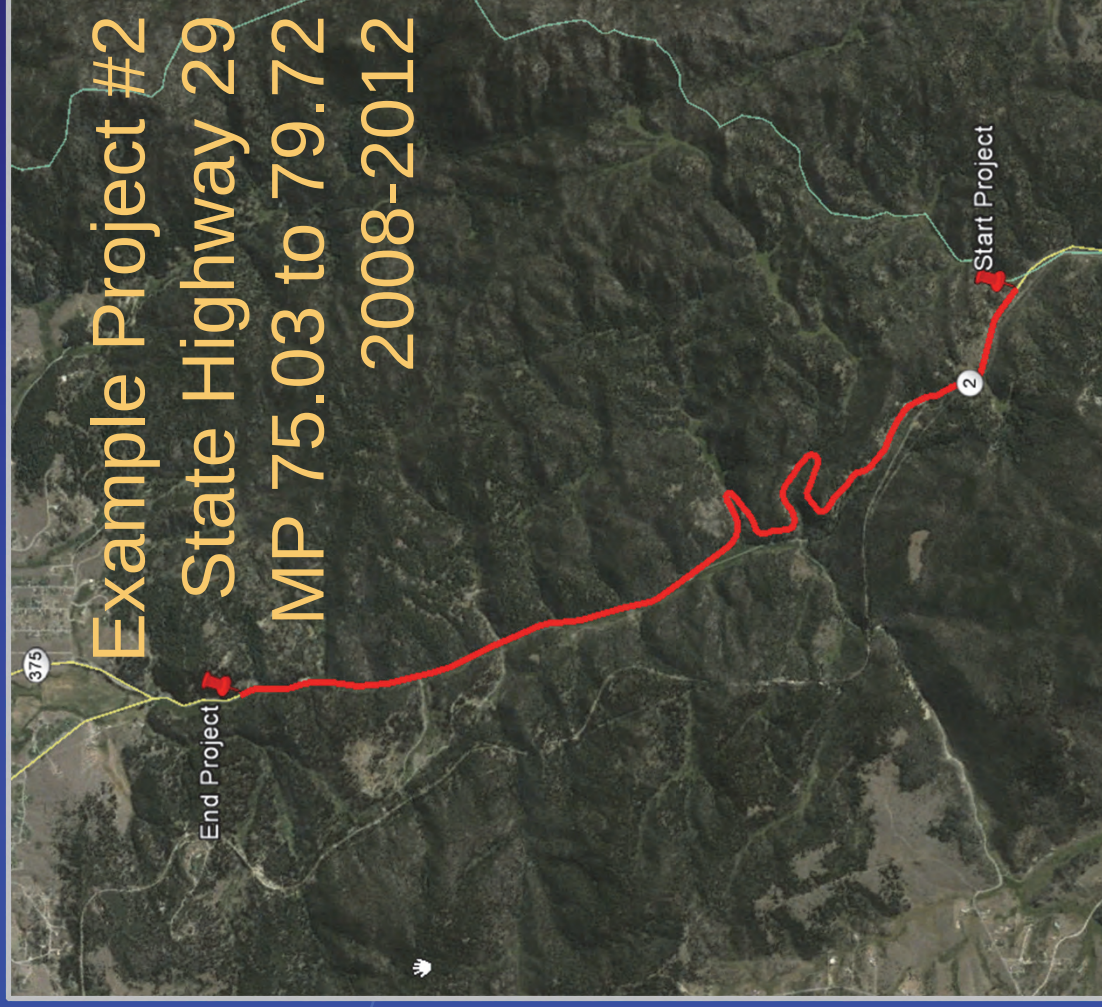
Contributing Factor	Veh 1	Veh 2	Veh 3	Direction	Veh 1	Veh 2	Veh 3
No Apparent Contributing Factor:	5	2	0	North:	4	1	0
Asleep at the Wheel:	1	0	0	Northeast:	0	0	0
Illness:	0	0	0	East:	16	2	0
Distracted by Passenger:	0	0	0	Southeast:	0	0	0
Driver Inexperience:	0	0	0	South:	2	1	0
Driver Fatigue:	0	0	0	Southwest:	0	0	0
Driver Preoccupied:	1	1	0	West:	18	2	1
Driver Unfamiliar with Area:	0	0	0	Northwest:	0	0	0
Driver Emotionally Upset:	0	0	0	Unknown:	0	1	0
Evading Law Enforcement Officer:	0	0	0	Total:	40	7	1
Physical Disability:	0	0	0				
Unknown:	33	4	1				
Total:	40	7	1				

Condition of Driver	Veh 1	Veh 2	Veh 3
No Impairment Suspected:	31	6	1
Alcohol Involved:	9	0	0
RX, Medication, or Drugs Involved:	0	0	0
Illegal Drugs Involved:	0	0	0
Alcohol and Drugs Involved:	0	0	0
Driver/Pedestrian not Observed:	0	1	0
Unknown:	0	0	0
Total:	40	7	1

ADT: 4,508 Length: 2.22



Example Project #2 State Highway 29 MP 75.03 to 79.72 2008-2012



Jake Kononov, P.E. Ph.D.
Bryan K. Allery, P.E.

Road Departure Class - November 2013

hwy	mp	date	time	severity	location	road_desc	acctype	driver_1
0029A	75.34	4/25/2010	0400	PDO	ON	NON-INTERSECTION	TREE/SHRUBBERY	NO IMPAIRMENT
0029A	75.50	1/1/2008	1045	INJ	OFF LEFT	NON-INTERSECTION	OVERTURNING	NO IMPAIRMENT
0029A	75.50	3/8/2009	1350	PDO	UNKNOWN	NON-INTERSECTION	TREE/SHRUBBERY	NO IMPAIRMENT
0029A	75.51	4/17/2009	2030	PDO	OFF LEFT	NON-INTERSECTION	OVERTURNING	ALCOHOL
0029A	75.72	8/28/2010	1530	INJ	ON	NON-INTERSECTION	OTHER NON-COLLISION	NO IMPAIRMENT
0029A	76.03	5/4/2011	2230	INJ	OFF RIGHT	NON-INTERSECTION	EMBANKMENT CUT/FILL SLOPE	ALCOHOL
0029A	76.19	6/19/2009	1210	INJ	UNKNOWN	NON-INTERSECTION	EMBANKMENT CUT/FILL SLOPE	NO IMPAIRMENT
0029A	76.24	8/24/2011	1420	INJ	OFF RIGHT	NON-INTERSECTION	OVERTURNING	ALCOHOL/DRUGS
0029A	76.29	9/20/2009	1420	FAT	ON	NON-INTERSECTION	TREE/SHRUBBERY	NO IMPAIRMENT
0029A	76.30	7/30/2008	1900	INJ	ON	NON-INTERSECTION	HEAD-ON	UNKNOWN
0029A	76.43	8/16/2011	1835	PDO	OFF LEFT	NON-INTERSECTION	OVERTURNING	NO IMPAIRMENT
0029A	76.43	11/17/2008	2315	PDO	UNKNOWN	NON-INTERSECTION	OTHER FIXED OBJECT	NO IMPAIRMENT
0029A	76.45	6/26/2009	1400	INJ	UNKNOWN	NON-INTERSECTION	EMBANKMENT CUT/FILL SLOPE	NO IMPAIRMENT
0029A	76.72	6/5/2011	1250	INJ	ON	NON-INTERSECTION	OVERTURNING	NO IMPAIRMENT
0029A	76.85	4/28/2009	0000	INJ	UNKNOWN	NON-INTERSECTION	OVERTURNING	NO IMPAIRMENT
0029A	77.03	7/27/2012	1520	PDO	ON	NON-INTERSECTION	LARGE BOULDERS OR ROCKS	NO IMPAIRMENT
0029A	77.20	6/13/2009	1030	INJ	UNKNOWN	NON-INTERSECTION	EMBANKMENT CUT/FILL SLOPE	NO IMPAIRMENT
0029A	77.20	5/16/2008	0520	PDO	ON	NON-INTERSECTION	WILD ANIMAL	NO IMPAIRMENT
0029A	77.30	2/16/2008	2115	PDO	OFF RIGHT	NON-INTERSECTION	TREE/SHRUBBERY	ALCOHOL
0029A	77.30	7/17/2008	1010	INJ	OFF RIGHT	NON-INTERSECTION	LARGE BOULDERS OR ROCKS	NO IMPAIRMENT
0029A	77.40	12/2/2008	2000	PDO	UNKNOWN	NON-INTERSECTION	GUARD RAIL	ALCOHOL
0029A	77.47	10/23/2012	1046	PDO	OFF LEFT	NON-INTERSECTION	EMBANKMENT CUT/FILL SLOPE	NO IMPAIRMENT
0029A	77.96	5/30/2011	0740	PDO	OFF LEFT	NON-INTERSECTION	EMBANKMENT CUT/FILL SLOPE	NO IMPAIRMENT
0029A	78.00	12/11/2010	2230	PDO	OFF LEFT	NON-INTERSECTION	OVERTURNING	NO IMPAIRMENT
0029A	78.27	10/9/2012	0001	PDO	ON	NON-INTERSECTION	WILD ANIMAL	NO IMPAIRMENT
0029A	78.36	2/23/2012	0946	INJ	OFF LEFT	NON-INTERSECTION	EMBANKMENT CUT/FILL SLOPE	NO IMPAIRMENT
0029A	78.37	3/14/2010	0810	INJ	OFF LEFT	NON-INTERSECTION	OVERTURNING	NO IMPAIRMENT
0029A	78.37	12/22/2008	1310	PDO	UNKNOWN	NON-INTERSECTION	TREE/SHRUBBERY	NO IMPAIRMENT
0029A	78.38	12/22/2008	1525	PDO	UNKNOWN	NON-INTERSECTION	OVERTURNING	NO IMPAIRMENT
0029A	78.42	4/4/2009	0943	PDO	UNKNOWN	NON-INTERSECTION	EMBANKMENT CUT/FILL SLOPE	NO IMPAIRMENT
0029A	78.66	12/22/2008	1625	INJ	UNKNOWN	NON-INTERSECTION	OTHER FIXED OBJECT	NO IMPAIRMENT
0029A	78.90	2/5/2008	0650	PDO	ON	NON-INTERSECTION	WILD ANIMAL	UNKNOWN
0029A	79.04	10/23/2009	0645	PDO	OFF RIGHT	NON-INTERSECTION	EMBANKMENT CUT/FILL SLOPE	NO IMPAIRMENT
0029A	79.19	9/25/2010	1655	INJ	ON	NON-INTERSECTION	OVERTURNING	NO IMPAIRMENT
0029A	79.21	3/16/2009	1016	PDO	UNKNOWN	NON-INTERSECTION	OVERTURNING	NO IMPAIRMENT
0029A	79.23	11/25/2011	0935	INJ	ON	NON-INTERSECTION	OVERTURNING	NO IMPAIRMENT
0029A	79.25	3/30/2009	1530	INJ	UNKNOWN	NON-INTERSECTION	EMBANKMENT CUT/FILL SLOPE	NO IMPAIRMENT
0029A	79.26	1/15/2012	1058	PDO	OFF LEFT	NON-INTERSECTION	EMBANKMENT CUT/FILL SLOPE	NO IMPAIRMENT
0029A	79.60	9/24/2008	0530	INJ	OFF LEFT	NON-INTERSECTION	OVERTURNING	NO IMPAIRMENT
0029A	79.69	1/1/2010	2300	PDO	OFF RIGHT	NON-INTERSECTION	EMBANKMENT CUT/FILL SLOPE	ALCOHOL

SH29A			
From:	75.03	Length:	4.69
To:	79.72	AADT:	893
From:	1/1/2008		
To:	12/31/2012		

Dispersion Parameter (α) RM2UH	
Inj:	0.9124
Total:	1.7235

Weight

$$W = \frac{1}{1 + \frac{(\mu \times n)}{\phi}}$$

$$\phi = 1/\alpha$$

EB Estimate

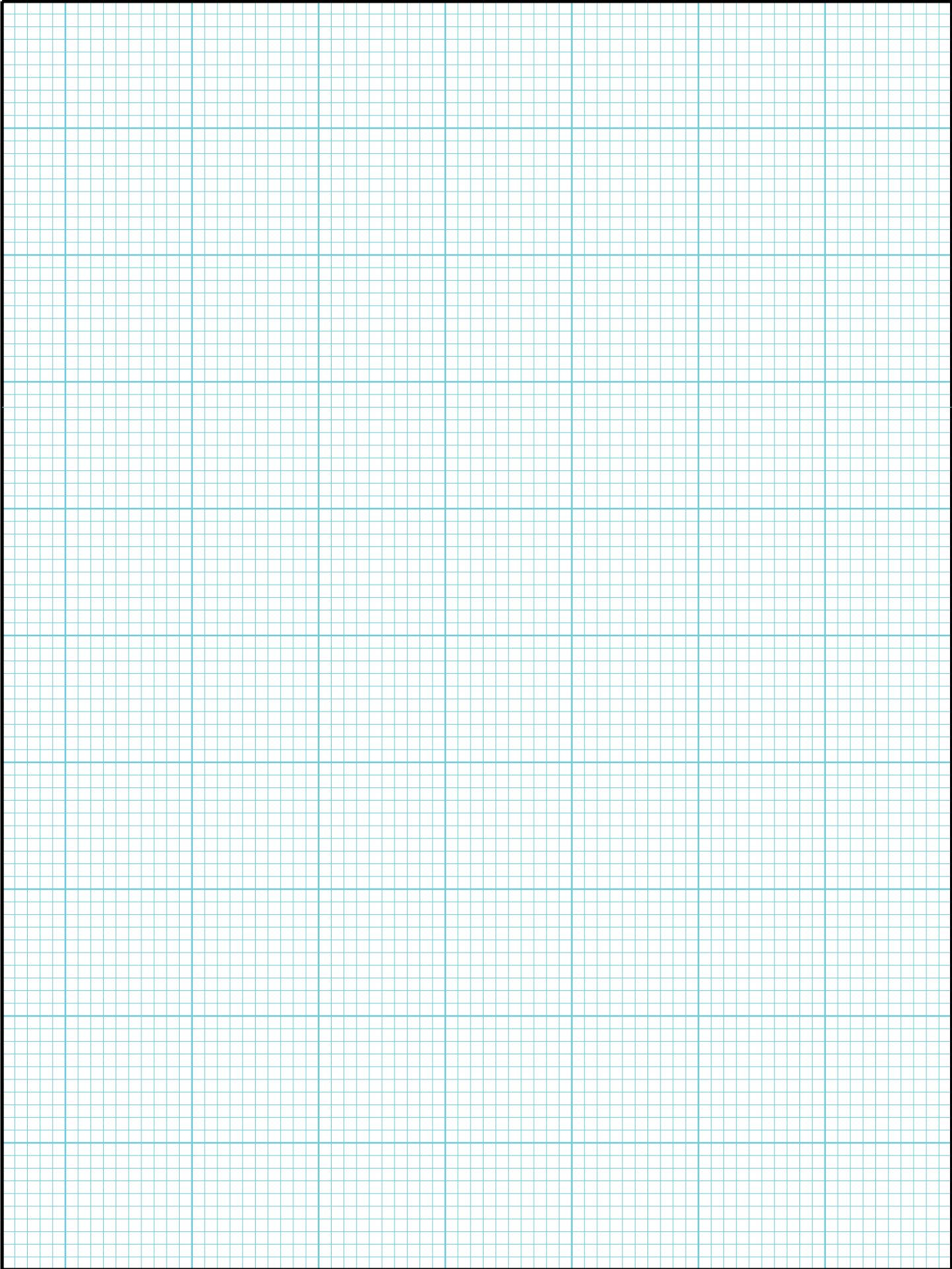
$$EB_{Est} = W \times \mu + (1 - W) \times \eta$$

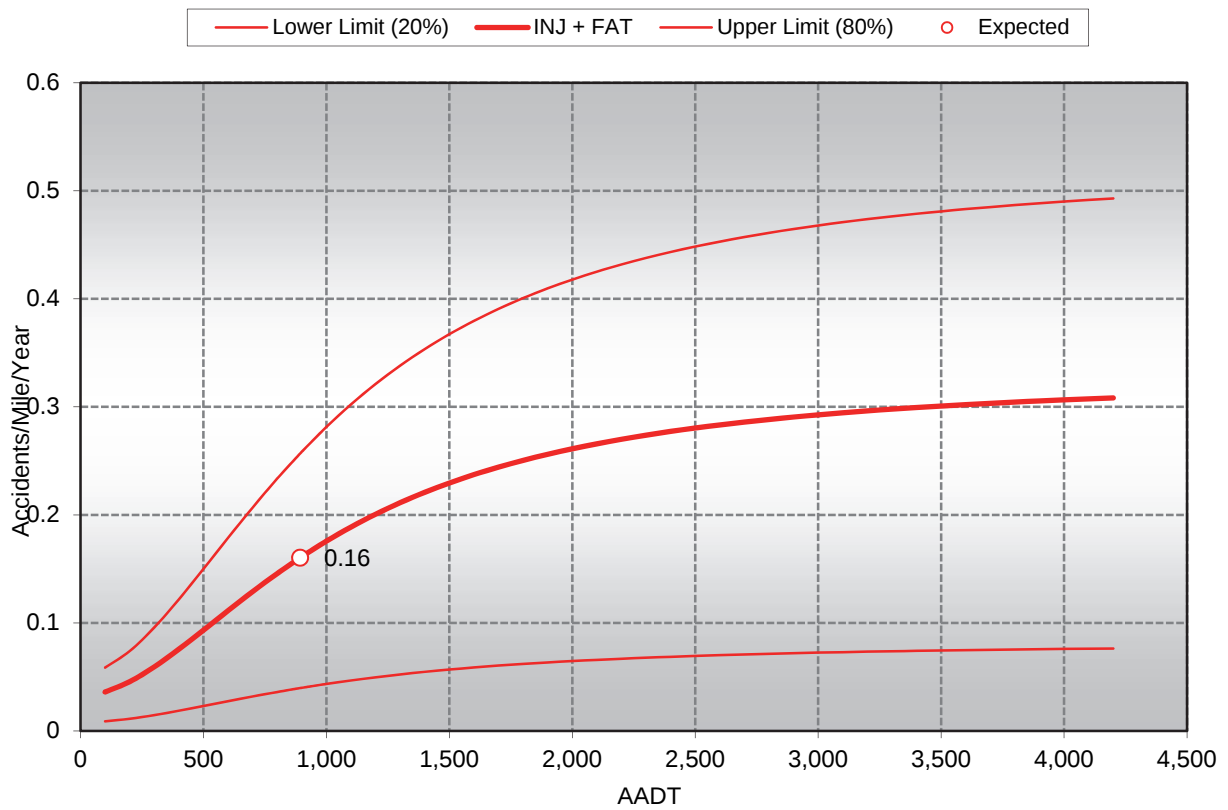
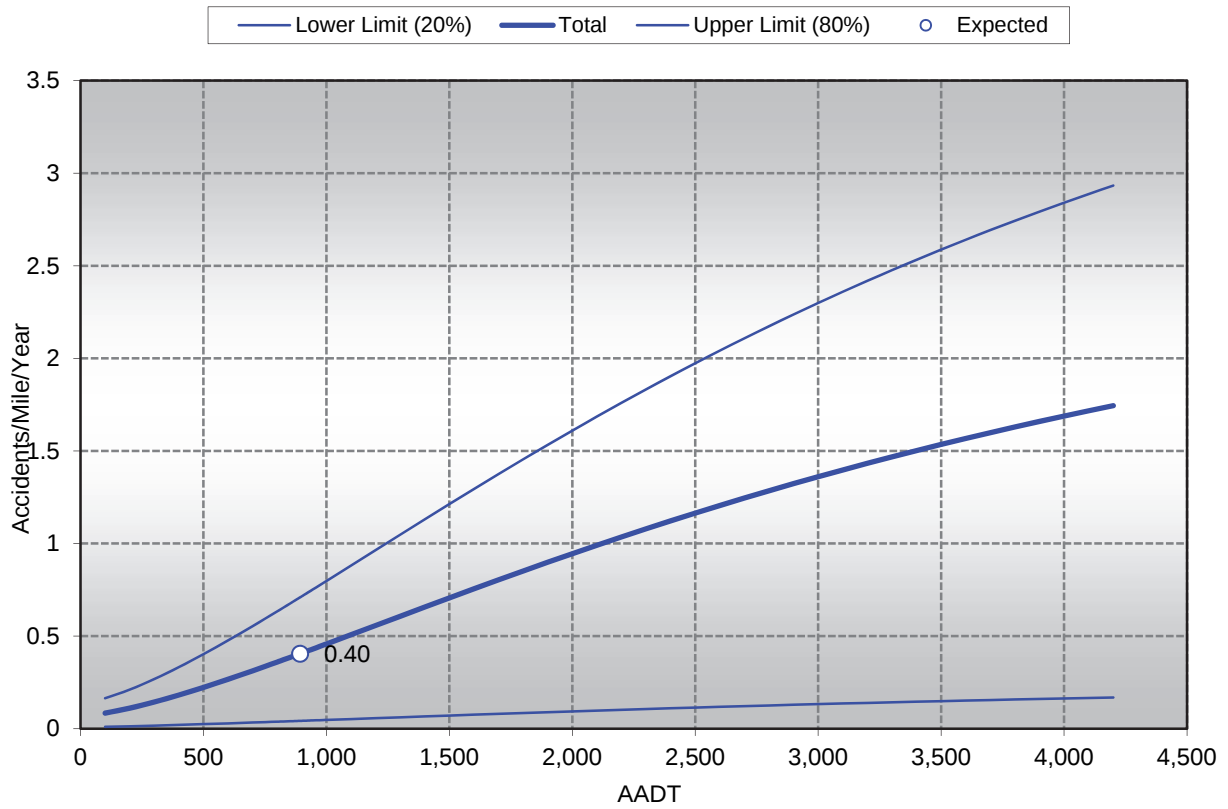
μ = Predicted by SPF

η = Number of Observed Crashes/Mile/Year

α = Dispersion Parameter from SPF Model

$$\phi = 1/\alpha$$





Montana Rural Mountainous 2-Lane Undivided Highways								
Description	0 - 0 ADT		0 - 1500 ADT		> 1500 ADT		All Totals	
	Accidents	Percent	Accidents	Percent	Accidents	Percent	Accidents	Percent
Severity								
PDO	0		456	59.14%	570	77.24%	1,026	67.99%
INJ	0		295	38.26%	154	20.87%	449	29.75%
FAT	0		20	2.59%	14	1.90%	34	2.25%
Persons Injured	0		403	N/A	222	N/A	625	N/A
Persons Killed	0		21	N/A	20	N/A	41	N/A
Number of Vehicles								
Single Vehicle Accidents	0		699	90.66%	649	87.94%	1,348	89.33%
Two Vehicle Accidents	0		65	8.43%	85	11.52%	150	9.94%
Three or more Vehicle Accident	0		7	0.91%	4	0.54%	11	0.73%
Unknown Number of Vehicles	0		0	0.00%	0	0.00%	0	0.00%
Location								
On Road	0		339	43.97%	449	60.84%	788	52.22%
Off Road	0		292	37.87%	145	19.65%	437	28.96%
Off Road Left	0		119	15.43%	57	7.72%	176	11.66%
Off Road Right	0		173	22.44%	88	11.92%	261	17.30%
Off Road at Tee	0		0	0.00%	0	0.00%	0	0.00%
Off Road in Median	0		0	0.00%	0	0.00%	0	0.00%
Unknown Road Location	0		140	18.16%	144	19.51%	284	18.82%
Accident Type								
Overturning	0		246	31.91%	111	15.04%	357	23.66%
Other Non Collision	0		21	2.72%	14	1.90%	35	2.32%
School Age Pedestrians	0		0	0.00%	0	0.00%	0	0.00%
All Other Pedestrians	0		0	0.00%	2	0.27%	2	0.13%
Broadside	0		5	0.65%	14	1.90%	19	1.26%
Head On	0		12	1.56%	7	0.95%	19	1.26%
Rear End	0		21	2.72%	22	2.98%	43	2.85%
Sideswipe (Same Direction)	0		3	0.39%	5	0.68%	8	0.53%
Sideswipe (Opposite Direction)	0		19	2.46%	19	2.57%	38	2.52%
Approach Turn	0		0	0.00%	0	0.00%	0	0.00%
Overtaking Turn	0		0	0.00%	0	0.00%	0	0.00%
Parked Motor Vehicle	0		2	0.26%	6	0.81%	8	0.53%
Railway Vehicle	0		0	0.00%	0	0.00%	0	0.00%
Bicycle	0		0	0.00%	0	0.00%	0	0.00%
Motorized Bicycle	0		0	0.00%	0	0.00%	0	0.00%
Domestic Animal	0		15	1.95%	13	1.76%	28	1.86%
Wild Animal	0		149	19.33%	318	43.09%	467	30.95%
Light or Utility Pole	0		6	0.78%	2	0.27%	8	0.53%
Traffic Signal Pole	0		0	0.00%	0	0.00%	0	0.00%
Sign	0		1	0.13%	7	0.95%	8	0.53%
Bridge Rail	0		2	0.26%	1	0.14%	3	0.20%
Guard Rail	0		55	7.13%	50	6.78%	105	6.96%
Cable Rail	0		0	0.00%	0	0.00%	0	0.00%
Median Barrier	0		3	0.39%	4	0.54%	7	0.46%
Bridge Abutment	0		0	0.00%	0	0.00%	0	0.00%
Column or Pier	0		0	0.00%	0	0.00%	0	0.00%
Culvert or Headwall	0		4	0.52%	3	0.41%	7	0.46%
Embankment	0		83	10.77%	47	6.37%	130	8.61%
Curb	0		0	0.00%	0	0.00%	0	0.00%
Delineator Post	0		0	0.00%	0	0.00%	0	0.00%
Fence	0		10	1.30%	21	2.85%	31	2.05%
Tree	0		71	9.21%	26	3.52%	97	6.43%
Large Boulder	0		15	1.95%	4	0.54%	19	1.26%
Rocks in Roadway	0		0	0.00%	0	0.00%	0	0.00%
Barricade	0		0	0.00%	0	0.00%	0	0.00%
Wall or Building	0		0	0.00%	0	0.00%	0	0.00%
Crash Cushion	0		0	0.00%	1	0.14%	1	0.07%
Mailbox	0		1	0.13%	1	0.14%	2	0.13%
Other Fixed Object	0		20	2.59%	22	2.98%	42	2.78%
Involving Other Object	0		2	0.26%	11	1.49%	13	0.86%
Road Maintenance Equipment	0		0	0.00%	0	0.00%	0	0.00%
Unknown Accident Type	0		5	0.65%	7	0.95%	12	0.80%
Total Fixed Objects	0		271	35.15%	189	25.61%	460	30.48%
Total Other Objects	0		2	0.26%	11	1.49%	13	0.86%

Montana Rural Mountainous 2-Lane Undivided Highways								
Description	0 - 0 ADT		0 - 1500 ADT		> 1500 ADT		All Totals	
	Accidents	Percent	Accidents	Percent	Accidents	Percent	Accidents	Percent
Lighting								
Daylight	0		482	62.52%	342	46.34%	824	54.61%
Dawn or Dusk	0		48	6.23%	78	10.57%	126	8.35%
Dark - Lighted	0		4	0.52%	10	1.36%	14	0.93%
Dark - Unlighted	0		235	30.48%	308	41.73%	543	35.98%
Unknown Lighting	0		2	0.26%	0	0.00%	2	0.13%
Weather								
No Adverse Weather	0		626	81.19%	604	81.84%	1,230	81.51%
Rain	0		27	3.50%	28	3.79%	55	3.64%
Snow or Sleet or Hail	0		103	13.36%	93	12.60%	196	12.99%
Fog	0		7	0.91%	8	1.08%	15	0.99%
Dust	0		0	0.00%	0	0.00%	0	0.00%
Wind	0		4	0.52%	3	0.41%	7	0.46%
Unknown Weather	0		4	0.52%	2	0.27%	6	0.40%
Road Condition								
Dry Road	0		480	62.26%	501	67.89%	981	65.01%
Wet Road	0		58	7.52%	66	8.94%	124	8.22%
Muddy Road	0		0	0.00%	1	0.14%	1	0.07%
Snowy Road	0		124	16.08%	80	10.84%	204	13.52%
Icy Road	0		98	12.71%	85	11.52%	183	12.13%
Slushy Road	0		0	0.00%	0	0.00%	0	0.00%
Foreign Material Road	0		0	0.00%	0	0.00%	0	0.00%
With Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Dry with Icy Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Wet with Icy Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Snowy with Icy Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Icy with Icy Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Slushy with Icy Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Unknown Road Condition	0		11	1.43%	5	0.68%	16	1.06%
Contributing Factor								
No Apparent Contributing Factor	0		120	15.56%	171	23.17%	291	19.28%
Asleep at the Wheel	0		7	0.91%	8	1.08%	15	0.99%
Illness	0		0	0.00%	0	0.00%	0	0.00%
Distracted by Passenger	0		0	0.00%	0	0.00%	0	0.00%
Driver Inexperience	0		0	0.00%	0	0.00%	0	0.00%
Driver Fatigue	0		0	0.00%	0	0.00%	0	0.00%
Driver Preoccupied	0		33	4.28%	16	2.17%	49	3.25%
Driver Unfamiliar with Area	0		0	0.00%	0	0.00%	0	0.00%
Driver Emotionally Upset	0		0	0.00%	0	0.00%	0	0.00%
Evading Law Enforcement Officer	0		0	0.00%	0	0.00%	0	0.00%
Physical Disability	0		0	0.00%	0	0.00%	0	0.00%
Unknown Contributing Factor	0		611	79.25%	543	73.58%	1,154	76.47%
Condition of Driver								
No Impairment Suspected	0		631	81.84%	650	88.08%	1,281	84.89%
Alcohol Involved	0		93	12.06%	51	6.91%	144	9.54%
RX Drugs or Medication Involved	0		0	0.00%	0	0.00%	0	0.00%
Illegal Drugs Involved	0		1	0.13%	3	0.41%	4	0.27%
Alcohol and Drugs Involved	0		13	1.69%	12	1.63%	25	1.66%
Driver/Pedestrian Not Observed	0		3	0.39%	3	0.41%	6	0.40%
Unknown Condition	0		30	3.89%	19	2.57%	49	3.25%
Total Accidents:	0		771	51.09%	738	48.91%	1,509	100.00%



Montana Department of Transportation
DiExSys™ Roadway Safety Systems
Detailed Accident Summary Report

11/03/2013

Job #: 20131103101638

Location: 29A Begin: 75.03 End: 79.72 From: 01/01/2008 To: 12/31/2012

Severity

PDO: 21
INJ: 18 24 :Injured
FAT: 1 1 :Killed

Total: 40

Number of Vehicles

One Vehicle: 38
Two Vehicles: 2
Three or More: 0
Unknown: 0

Total: 40

Location

On Road: 11
Off Road Left: 10
Off Road Right: 6
Off Road at Tee: 0
Off in Median: 0
Unknown: 13

Total: 40

Lighting Conditions

Daylight: 29
Dawn or Dusk: 3
Dark - Lighted: 0
Dark - Unlighted: 8
Unknown: 0

Total: 40

Weather Conditions

None: 32
Rain: 0
Snow/Sleet/Hail: 7
Fog: 0
Dust: 0
Wind: 0
Unknown: 1

Total: 40

Accident Rates

PDO: 2.74 * * MVMT
INJ: 2.35 * ** 100 MVMT
FAT: 13.07 ** **Total: 5.23 ***

Accident Type

Overturning: 13
Other Non Collision: 1
Pedestrians: 0
Broadside: 0
Head On: 1
Rear End: 0
Sideswipe (Same): 0
Sideswipe (Opposite): 0
Approach Turn: 0
Overtaking Turn: 0
Parked Motor Vehicle: 0
Railway Vehicle: 0
Bicycle: 0
Motorized Bicycle: 0
Domestic Animal: 0
Wild Animal: 3
Light/Utility Pole: 0
Traffic Signal Pole: 0
Sign: 0
Bridge Rail: 0
Guard Rail: 1
Cable Rail: 0
Concrete Barrier: 0

Bridge Abutment: 0
Column/Pier: 0
Culvert/Headwall: 0
Embankment: 12
Curb: 0
Delineator Post: 0
Fence: 0
Tree: 5
Large Boulders or Rocks: 2
Barricade: 0
Wall/Building: 0
Crash Cushion: 0
Mailbox: 0
Other Fixed Object: 2
Total Fixed Objects: 22
Rocks in Roadway: 0
Vehicle Cargo/Debris: 0
Road Maintenance Equipment: 0
Involving Other Object: 0
Total Other Objects: 0
Unknown: 0

Total: 40

Mainline/Ramps/Frontage Roads

Mainline: 40
Crossroad (A): 0

Frontage/Ramp Intersections

M: 0 N: 0 O: 0 P: 0

Ramps

B: 0 F: 0 J: 0
C: 0 G: 0 K: 0
D: 0 H: 0 L: 0
E: 0 I: 0

Left Frontage Rd (L): 0
Rt Frontage Rd (R): 0
HOV Lanes (V): 0
Unknown: 0

Total: 40

Road Description

At Intersection: 0
At Driveway Access: 0
Intersection Related: 0
Non Intersection: 40
In Alley: 0
Roundabout: 0
Ramp: 0
Parking Lot: 0
Unknown: 0

Total: 40

Road Conditions

Dry: 21
Wet: 2
Muddy: 0
Snowy: 14
Icy: 3
Slushy: 0
Foreign Material: 0
With Road Treatment: 0
Dry w/Icy Road Treatment: 0
Wet w/Icy Road Treatment: 0
Snowy w/Icy Road Treatment: 0
Icy w/Icy Road Treatment: 0
Slushy w/Icy Road Treatment: 0
Unknown: 0

Total: 40

ADT: 893 Length: 4.69



Montana Department of Transportation
DiExSys™ Roadway Safety Systems
Detailed Accident Summary Report

11/03/2013

Job #: 20131103101638

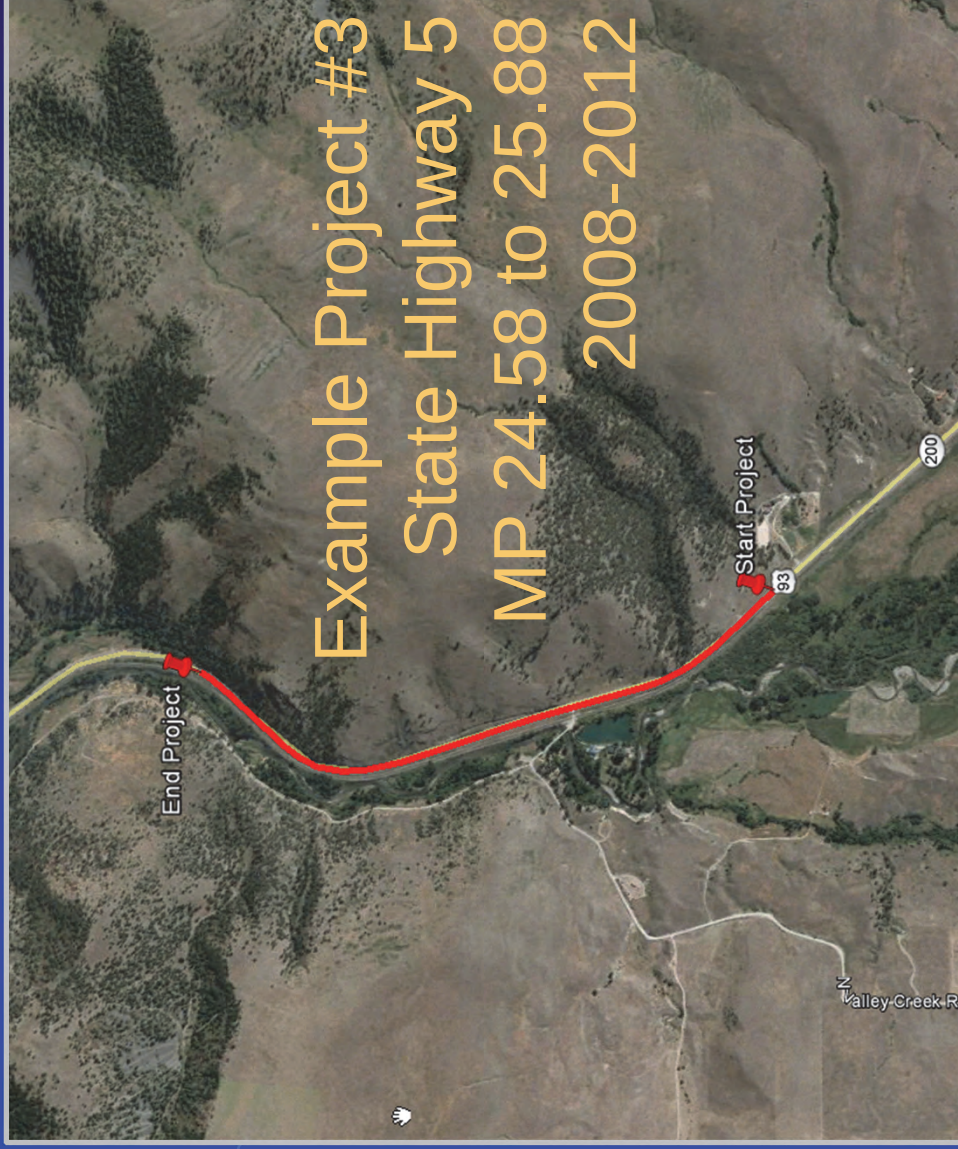
Location: 29A Begin: 75.03 End: 79.72 From: 01/01/2008 To: 12/31/2012

Vehicle Type	Veh 1	Veh 2	Veh 3	Vehicle Movement	Veh 1	Veh 2	Veh 3
Passenger Car/Van:	18	0	0	Going Straight:	36	2	0
Passenger Car/Van w/Trl:	0	0	0	Slowing:	1	0	0
Pickup Truck/Utility Van:	11	0	0	Stopped in Traffic:	0	0	0
Pickup Truck/Utility Van w/Trl:	0	0	0	Making Right Turn:	1	0	0
Truck 10k lbs or Less:	0	0	0	Making Left Turn:	0	0	0
Trucks > 10k lbs/Bus > 15 People:	0	0	0	Making U-Turn:	0	0	0
School Bus < 15 People:	0	0	0	Passing:	0	0	0
Non School Bus < 15 People:	0	0	0	Backing:	0	0	0
Motorhome:	0	0	0	Enter/Leave Parked Position:	0	0	0
Motorcycle:	6	1	0	Starting in Traffic:	1	0	0
Bicycle:	0	0	0	Parked:	0	0	0
Motorized Bicycle:	0	0	0	Changing Lanes:	0	0	0
Farm Equipment:	0	0	0	Avoiding Object/Veh in Road:	0	0	0
Hit and Run - Unknown:	0	0	0	Weaving:	0	0	0
Other:	0	0	0	Other:	1	0	0
Unknown:	0	0	0	Unknown:	0	0	0
Total:	40	2	0	Total:	40	2	0

Contributing Factor	Veh 1	Veh 2	Veh 3	Direction	Veh 1	Veh 2	Veh 3
No Apparent Contributing Factor:	4	1	0	North:	11	0	0
Asleep at the Wheel:	0	0	0	Northeast:	0	0	0
Illness:	0	0	0	East:	8	1	0
Distracted by Passenger:	0	0	0	Southeast:	0	0	0
Driver Inexperience:	0	0	0	South:	3	0	0
Driver Fatigue:	0	0	0	Southwest:	0	0	0
Driver Preoccupied:	1	0	0	West:	17	1	0
Driver Unfamiliar with Area:	0	0	0	Northwest:	0	0	0
Driver Emotionally Upset:	0	0	0	Unknown:	1	0	0
Evading Law Enforcement Officer:	0	0	0	Total:	40	2	0
Physical Disability:	0	0	0				
Unknown:	35	1	0				
Total:	40	2	0				

Condition of Driver	Veh 1	Veh 2	Veh 3
No Impairment Suspected:	32	2	0
Alcohol Involved:	5	0	0
RX, Medication, or Drugs Involved:	0	0	0
Illegal Drugs Involved:	0	0	0
Alcohol and Drugs Involved:	1	0	0
Driver/Pedestrian not Observed:	0	0	0
Unknown:	2	0	0
Total:	40	2	0

ADT: 893 Length: 4.69



Example Project #3 State Highway 5 MP 24.58 to 25.88 2008-2012

Jake Kononov, P.E. Ph.D.
Bryan K. Allery, P.E.

hwy	mp	date	time	severity	location	road_desc	acctype	driver_1
0005A	24.72	6/29/2009	1821	FAT	ON	NON-INTERSECTION	HEAD-ON	NO IMPAIRMENT
0005A	24.80	1/9/2008	0835	PDO	ON	NON-INTERSECTION	GUARD RAIL	NO IMPAIRMENT
0005A	24.83	11/29/2010	2110	FAT	ON	NON-INTERSECTION	OVERTURNING	NO IMPAIRMENT
0005A	25.00	10/24/2008	0630	PDO	UNKNOWN	NON-INTERSECTION	INVOLVING OTHER OBJECT	NO IMPAIRMENT
0005A	25.06	9/16/2010	2315	PDO	ON	NON-INTERSECTION	WILD ANIMAL	NO IMPAIRMENT
0005A	25.32	12/15/2010	0818	PDO	OFF RIGHT	NON-INTERSECTION	GUARD RAIL	NO IMPAIRMENT
0005A	25.36	10/17/2011	0833	PDO	ON	NON-INTERSECTION	SIDESWIPE OPPOSITE DIRECTION	NO IMPAIRMENT
0005A	25.43	3/3/2009	0518	INJ	UNKNOWN	NON-INTERSECTION	GUARD RAIL	NO IMPAIRMENT
0005A	25.43	3/3/2009	0520	PDO	UNKNOWN	NON-INTERSECTION	GUARD RAIL	NO IMPAIRMENT
0005A	25.43	6/13/2009	1726	INJ	ON	NON-INTERSECTION	GUARD RAIL	UNKNOWN
0005A	25.44	9/1/2011	1400	INJ	ON	NON-INTERSECTION	LARGE BOULDERS OR ROCKS	NO IMPAIRMENT
0005A	25.45	12/30/2010	1445	INJ	ON	NON-INTERSECTION	GUARD RAIL	NO IMPAIRMENT
0005A	25.45	11/24/2010	1905	INJ	OFF RIGHT	NON-INTERSECTION	OVERTURNING	NO IMPAIRMENT
0005A	25.46	11/15/2011	1646	PDO	ON	NON-INTERSECTION	REAR-END	NO IMPAIRMENT
0005A	25.48	11/15/2011	1633	PDO	OFF RIGHT	NON-INTERSECTION	EMBANKMENT CUT/FILL SLOPE	NO IMPAIRMENT
0005A	25.50	3/31/2008	0715	INJ	ON	NON-INTERSECTION	EMBANKMENT CUT/FILL SLOPE	NO IMPAIRMENT
0005A	25.50	12/5/2008	2123	INJ	OFF RIGHT	NON-INTERSECTION	EMBANKMENT CUT/FILL SLOPE	ALCOHOL
0005A	25.52	9/13/2012	1420	FAT	ON	NON-INTERSECTION	HEAD-ON	UNKNOWN
0005A	25.60	8/15/2008	1039	INJ	ON	NON-INTERSECTION	GUARD RAIL	NO IMPAIRMENT
0005A	25.61	2/25/2010	0654	INJ	OFF RIGHT	NON-INTERSECTION	EMBANKMENT CUT/FILL SLOPE	NO IMPAIRMENT
0005A	25.65	6/13/2012	1145	PDO	ON	NON-INTERSECTION	UNKNOWN	NO IMPAIRMENT
0005A	25.68	5/19/2009	1000	PDO	UNKNOWN	NON-INTERSECTION	GUARD RAIL	NO IMPAIRMENT
0005A	25.70	7/21/2008	2230	INJ	ON	NON-INTERSECTION	WILD ANIMAL	NO IMPAIRMENT

SH5A			
From:	24.58	Length:	4.69
To:	25.88	AADT:	893
		From:	1/1/2008
		To:	12/31/2012

Dispersion Parameter (α) RFRR2UH	
Inj:	1.462
Total:	1.435

Weight

$$W = \frac{1}{1 + \frac{(\mu \times n)}{\phi}}$$

$$\phi = 1/\alpha$$

EB Estimate

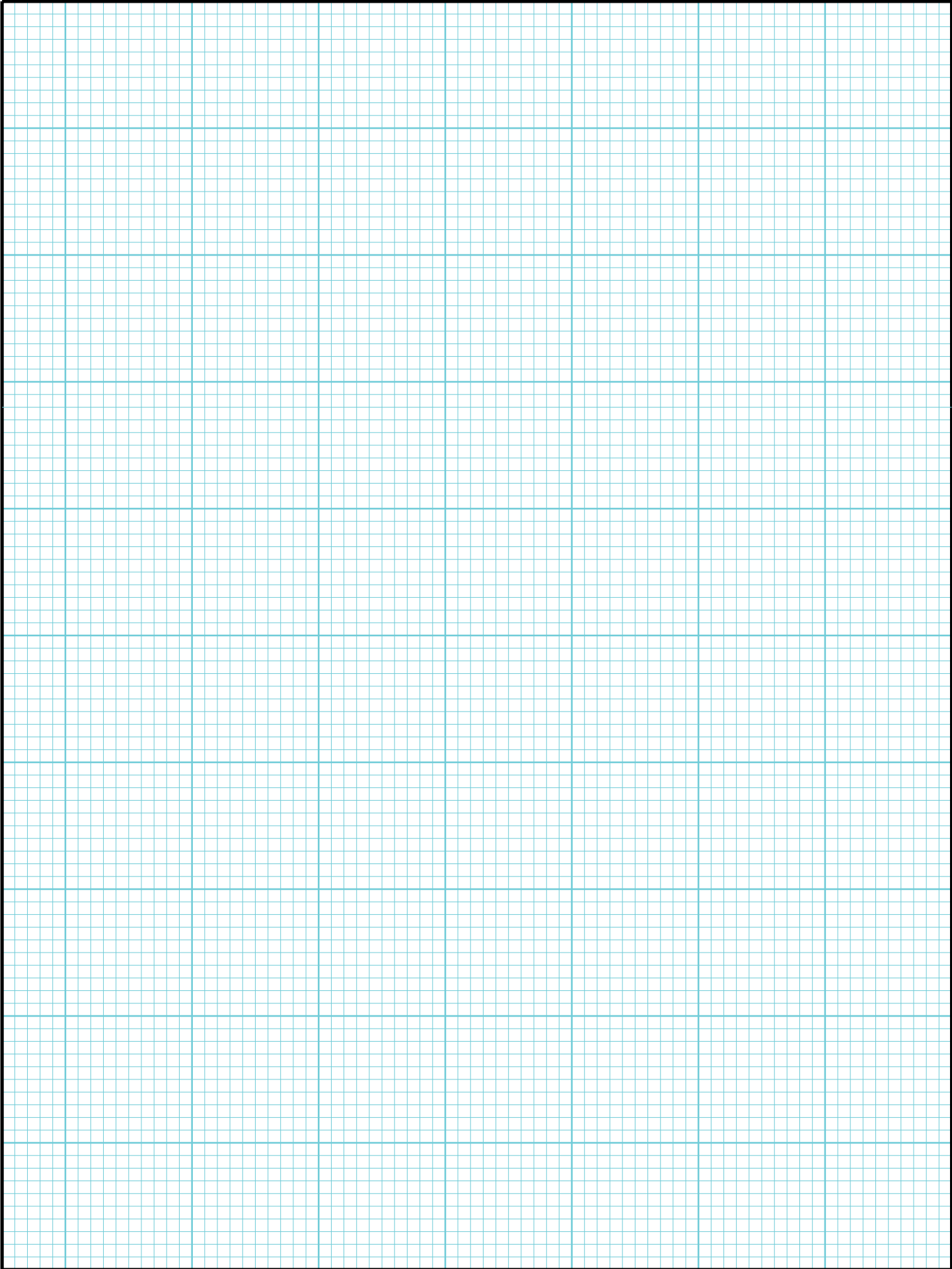
$$EB_{Est} = W \times \mu + (1 - W) \times \eta$$

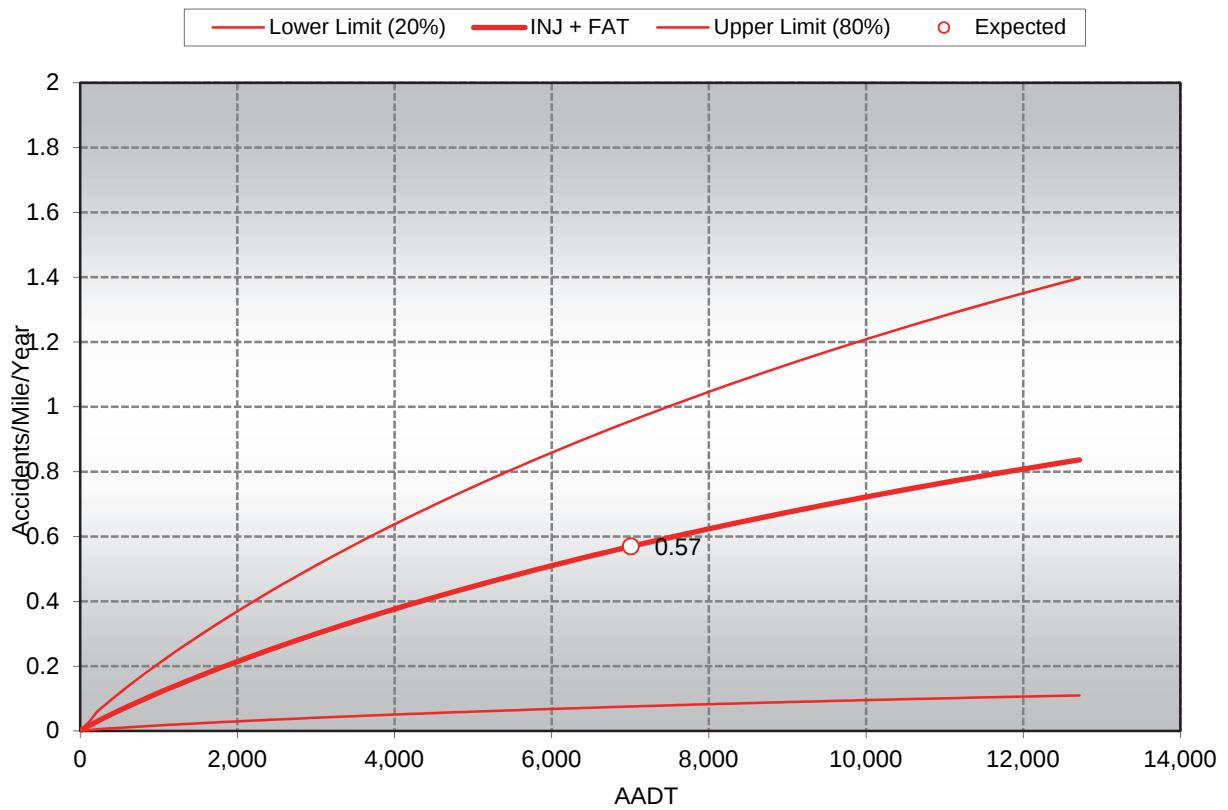
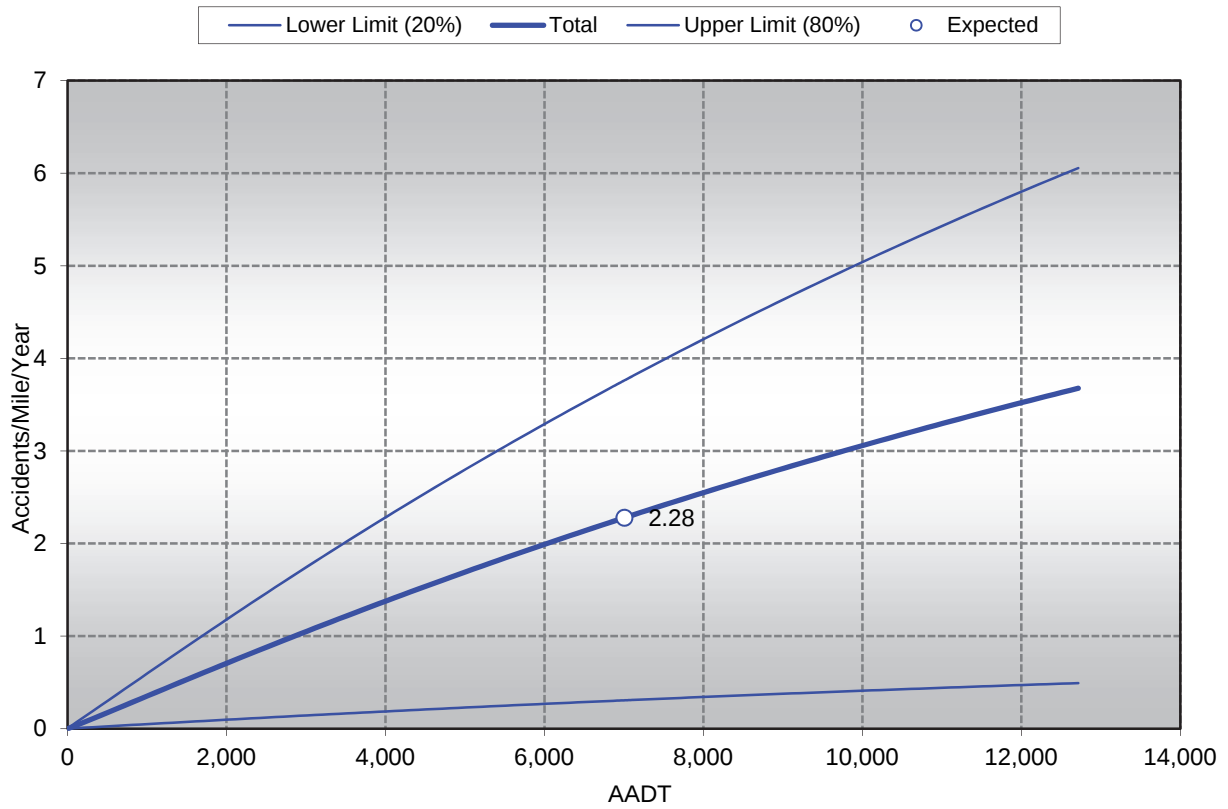
μ = Predicted by SPF

η = Number of Observed Crashes/Mile/Year

α = Dispersion Parameter from SPF Model

$$\phi = 1/\alpha$$





Montana Rural Flat and Rolling 2-Lane Undivided Highways								
Description	0 - 3000 ADT		3000 - 8000 ADT		> 8000 ADT		All Totals	
	Accidents	Percent	Accidents	Percent	Accidents	Percent	Accidents	Percent
Severity								
PDO	6,951	66.96%	2,320	73.14%	470	76.42%	9,741	68.75%
INJ	3,157	30.41%	798	25.16%	140	22.76%	4,095	28.90%
FAT	273	2.63%	54	1.70%	5	0.81%	332	2.34%
Persons Injured	4,585	N/A	1,124	N/A	214	N/A	5,923	N/A
Persons Killed	307	N/A	62	N/A	6	N/A	375	N/A
Number of Vehicles								
Single Vehicle Accidents	9,079	87.46%	2,487	78.40%	388	63.09%	11,954	84.37%
Two Vehicle Accidents	1,217	11.72%	622	19.61%	194	31.54%	2,033	14.35%
Three or more Vehicle Accident	85	0.82%	63	1.99%	33	5.37%	181	1.28%
Unknown Number of Vehicles	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Location								
On Road	5,524	53.21%	1,947	61.38%	427	69.43%	7,898	55.75%
Off Road	3,041	29.29%	671	21.15%	82	13.33%	3,794	26.78%
Off Road Left	1,275	12.28%	242	7.63%	31	5.04%	1,548	10.93%
Off Road Right	1,766	17.01%	429	13.52%	51	8.29%	2,246	15.85%
Off Road at Tee	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Off Road in Median	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Unknown Road Location	1,816	17.49%	554	17.47%	106	17.24%	2,476	17.48%
Accident Type								
Overturning	2,968	28.59%	490	15.45%	53	8.62%	3,511	24.78%
Other Non Collision	337	3.25%	98	3.09%	8	1.30%	443	3.13%
School Age Pedestrians	0	0.00%	0	0.00%	0	0.00%	0	0.00%
All Other Pedestrians	18	0.17%	9	0.28%	0	0.00%	27	0.19%
Broadside	152	1.46%	82	2.59%	21	3.41%	255	1.80%
Head On	135	1.30%	71	2.24%	15	2.44%	221	1.56%
Rear End	396	3.81%	281	8.86%	135	21.95%	812	5.73%
Sideswipe (Same Direction)	191	1.84%	53	1.67%	14	2.28%	258	1.82%
Sideswipe (Opposite Direction)	241	2.32%	95	2.99%	20	3.25%	356	2.51%
Approach Turn	7	0.07%	7	0.22%	4	0.65%	18	0.13%
Overtaking Turn	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Parked Motor Vehicle	29	0.28%	12	0.38%	2	0.33%	43	0.30%
Railway Vehicle	4	0.04%	1	0.03%	0	0.00%	5	0.04%
Bicycle	2	0.02%	1	0.03%	0	0.00%	3	0.02%
Motorized Bicycle	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Domestic Animal	468	4.51%	55	1.73%	5	0.81%	528	3.73%
Wild Animal	2,653	25.56%	1,127	35.53%	229	37.24%	4,009	28.30%
Light or Utility Pole	88	0.85%	46	1.45%	7	1.14%	141	1.00%
Traffic Signal Pole	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Sign	67	0.65%	21	0.66%	3	0.49%	91	0.64%
Bridge Rail	44	0.42%	10	0.32%	3	0.49%	57	0.40%
Guard Rail	472	4.55%	126	3.97%	9	1.46%	607	4.28%
Cable Rail	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Median Barrier	38	0.37%	3	0.09%	4	0.65%	45	0.32%
Bridge Abutment	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Column or Pier	14	0.13%	6	0.19%	14	2.28%	22	0.16%
Culvert or Headwall	52	0.50%	10	0.32%	3	0.49%	65	0.46%
Embankment	897	8.64%	229	7.22%	26	4.23%	1,152	8.13%
Curb	4	0.04%	0	0.00%	0	0.00%	4	0.03%
Delineator Post	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Fence	352	3.39%	89	2.81%	13	2.11%	454	3.20%
Tree	257	2.48%	80	2.52%	9	1.46%	346	2.44%
Large Boulder	45	0.43%	12	0.38%	0	0.00%	57	0.40%
Rocks in Roadway	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Barricade	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Wall or Building	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Crash Cushion	5	0.05%	2	0.06%	1	0.16%	8	0.06%
Mailbox	22	0.21%	13	0.41%	3	0.49%	38	0.27%
Other Fixed Object	204	1.97%	42	1.32%	11	1.79%	257	1.81%
Involving Other Object	87	0.84%	60	1.89%	4	0.65%	151	1.07%
Road Maintenance Equipment	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Unknown Accident Type	132	1.27%	41	1.29%	11	1.79%	184	1.30%
Total Fixed Objects	2,561	24.67%	689	21.72%	94	15.28%	3,344	23.60%
Total Other Objects	87	0.84%	60	1.89%	4	0.65%	151	1.07%

Montana Rural Flat and Rolling 2-Lane Undivided Highways								
Description	0 - 3000 ADT		3000 - 8000 ADT		> 8000 ADT		All Totals	
	Accidents	Percent	Accidents	Percent	Accidents	Percent	Accidents	Percent
Lighting								
Daylight	5,500	52.98%	1,539	48.52%	315	51.22%	7,354	51.91%
Dawn or Dusk	730	7.03%	208	6.56%	47	7.64%	985	6.95%
Dark - Lighted	108	1.04%	58	1.83%	16	2.60%	182	1.28%
Dark - Unlighted	4,018	38.71%	1,359	42.84%	236	38.37%	5,613	39.62%
Unknown Lighting	25	0.24%	8	0.25%	1	0.16%	34	0.24%
Weather								
No Adverse Weather	8,446	81.36%	2,595	81.81%	516	83.90%	11,557	81.57%
Rain	361	3.48%	112	3.53%	24	3.90%	497	3.51%
Snow or Sleet or Hail	1,312	12.64%	404	12.74%	68	11.06%	1,784	12.59%
Fog	115	1.11%	31	0.98%	5	0.81%	151	1.07%
Dust	3	0.03%	0	0.00%	0	0.00%	3	0.02%
Wind	117	1.13%	17	0.54%	2	0.33%	136	0.96%
Unknown Weather	27	0.26%	13	0.41%	0	0.00%	40	0.28%
Road Condition								
Dry Road	7,062	68.03%	2,128	67.09%	418	67.97%	9,608	67.81%
Wet Road	742	7.15%	294	9.27%	68	11.06%	1,104	7.79%
Muddy Road	11	0.11%	2	0.06%	3	0.49%	16	0.11%
Snowy Road	1,078	10.38%	333	10.50%	44	7.15%	1,455	10.27%
Icy Road	1,330	12.81%	393	12.39%	80	13.01%	1,803	12.73%
Slushy Road	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Foreign Material Road	0	0.00%	1	0.03%	0	0.00%	1	0.01%
With Road Treatment	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Dry with Icy Road Treatment	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Wet with Icy Road Treatment	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Snowy with Icy Road Treatment	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Icy with Icy Road Treatment	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Slushy with Icy Road Treatment	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Unknown Road Condition	158	1.52%	21	0.66%	2	0.33%	181	1.28%
Contributing Factor								
No Apparent Contributing Factor	1,768	17.03%	699	22.04%	137	22.28%	2,604	18.38%
Asleep at the Wheel	284	2.74%	65	2.05%	4	0.65%	353	2.49%
Illness	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Distracted by Passenger	2	0.02%	1	0.03%	2	0.33%	5	0.04%
Driver Inexperience	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Driver Fatigue	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Driver Preoccupied	528	5.09%	129	4.07%	34	5.53%	691	4.88%
Driver Unfamiliar with Area	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Driver Emotionally Upset	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Evading Law Enforcement Officer	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Physical Disability	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Unknown Contributing Factor	7,799	75.13%	2,278	71.82%	438	71.22%	10,515	74.22%
Condition of Driver								
No Impairment Suspected	8,646	83.29%	2,724	85.88%	568	92.36%	11,938	84.26%
Alcohol Involved	1,070	10.31%	278	8.76%	37	6.02%	1,385	9.78%
RX Drugs or Medication Involved	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Illegal Drugs Involved	65	0.63%	35	1.10%	1	0.16%	101	0.71%
Alcohol and Drugs Involved	184	1.77%	48	1.51%	5	0.81%	237	1.67%
Driver/Pedestrian Not Observed	52	0.50%	12	0.38%	0	0.00%	64	0.45%
Unknown Condition	364	3.51%	75	2.36%	4	0.65%	443	3.13%
Total Accidents:	10,381	73.27%	3,172	22.39%	615	4.34%	14,168	100.00%



Montana Department of Transportation
DiExSys™ Roadway Safety Systems
Detailed Accident Summary Report

11/03/2013

Job #: 20131103105313

Location: 5A Begin: 24.58 End: 25.88 From:01/01/2008 To:12/31/2012

Severity

PDO: 10
INJ: 10 15 :Injured
FAT: 3 3 :Killed

Total: 23

Number of Vehicles

One Vehicle: 18
Two Vehicles: 5
Three or More: 0
Unknown: 0

Total: 23

Location

On Road: 14
Off Road Left: 0
Off Road Right: 5
Off Road at Tee: 0
Off in Median: 0
Unknown: 4

Total: 23

Lighting Conditions

Daylight: 15
Dawn or Dusk: 1
Dark - Lighted: 0
Dark - Unlighted: 7
Unknown: 0

Total: 23

Weather Conditions

None: 21
Rain: 1
Snow/Sleet/Hail: 1
Fog: 0
Dust: 0
Wind: 0
Unknown: 0

Total: 23

Accident Rates

PDO: 0.60 * * MVMT
INJ: 0.60 * ** 100 MVMT
FAT: 18.03 ** **Total: 1.38 ***

Accident Type

Overturning:	2	Bridge Abutment:	0
Other Non Collision:	0	Column/Pier:	0
Pedestrians:	0	Culvert/Headwall:	0
Broadside:	0	Embankment:	4
Head On:	2	Curb:	0
Rear End:	1	Delineator Post:	0
Sideswipe (Same):	0	Fence:	0
Sideswipe (Opposite):	1	Tree:	0
Approach Turn:	0	Large Boulders or Rocks:	1
Overtaking Turn:	0	Barricade:	0
Parked Motor Vehicle:	0	Wall/Building:	0
Railway Vehicle:	0	Crash Cushion:	0
Bicycle:	0	Mailbox:	0
Motorized Bicycle:	0	Other Fixed Object:	0
Domestic Animal:	0	Total Fixed Objects:	13
Wild Animal:	2	Rocks in Roadway:	0
Light/Utility Pole:	0	Vehicle Cargo/Debris:	0
Traffic Signal Pole:	0	Road Maintenance Equipment:	0
Sign:	0	Involving Other Object:	1
Bridge Rail:	0	Total Other Objects:	1
Guard Rail:	8	Unknown:	1
Cable Rail:	0		
Concrete Barrier:	0		

Total: 23

Mainline/Ramps/Frontage Roads

Mainline: 23
Crossroad (A): 0

Frontage/Ramp Intersections

M: 0 N: 0 O: 0 P: 0

Ramps

B: 0 F: 0 J: 0
C: 0 G: 0 K: 0
D: 0 H: 0 L: 0
E: 0 I: 0

Left Frontage Rd (L): 0
Rt Frontage Rd (R): 0
HOV Lanes (V): 0
Unknown: 0

Total: 23

Road Description

At Intersection: 0
At Driveway Access: 0
Intersection Related: 0
Non Intersection: 23
In Alley: 0
Roundabout: 0
Ramp: 0
Parking Lot: 0
Unknown: 0

Total: 23

Road Conditions

Dry: 11
Wet: 3
Muddy: 0
Snowy: 3
Icy: 6
Slushy: 0
Foreign Material: 0
With Road Treatment: 0
Dry w/Icy Road Treatment: 0
Wet w/Icy Road Treatment: 0
Snowy w/Icy Road Treatment: 0
Icy w/Icy Road Treatment: 0
Slushy w/Icy Road Treatment: 0
Unknown: 0

Total: 23

ADT: 7,006 Length: 1.30



Montana Department of Transportation
DiExSys™ Roadway Safety Systems
Detailed Accident Summary Report

11/03/2013

Job #: 20131103105313

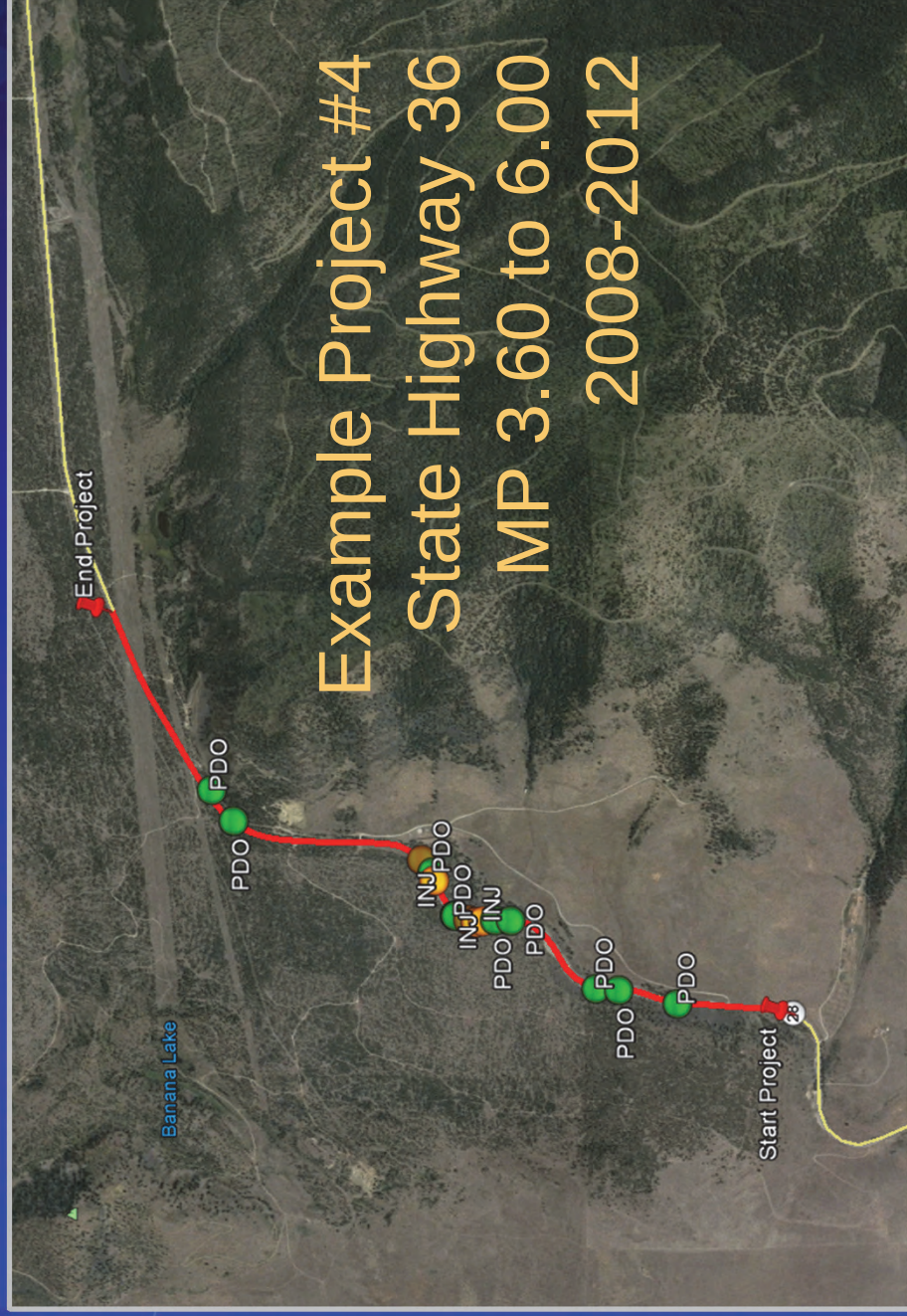
Location: 5A Begin: 24.58 End: 25.88 From: 01/01/2008 To: 12/31/2012

Vehicle Type	Veh 1	Veh 2	Veh 3	Vehicle Movement	Veh 1	Veh 2	Veh 3
Passenger Car/Van:	11	1	0	Going Straight:	22	4	0
Passenger Car/Van w/Trl:	0	0	0	Slowing:	0	1	0
Pickup Truck/Utility Van:	6	2	0	Stopped in Traffic:	0	0	0
Pickup Truck/Utility Van w/Trl:	0	0	0	Making Right Turn:	0	0	0
Truck 10k lbs or Less:	0	0	0	Making Left Turn:	0	0	0
Trucks > 10k lbs/Bus > 15 People:	1	0	0	Making U-Turn:	0	0	0
School Bus < 15 People:	0	0	0	Passing:	0	0	0
Non School Bus < 15 People:	0	0	0	Backing:	1	0	0
Motorhome:	0	0	0	Enter/Leave Parked Position:	0	0	0
Motorcycle:	2	0	0	Starting in Traffic:	0	0	0
Bicycle:	0	0	0	Parked:	0	0	0
Motorized Bicycle:	0	0	0	Changing Lanes:	0	0	0
Farm Equipment:	0	0	0	Avoiding Object/Veh in Road:	0	0	0
Hit and Run - Unknown:	0	0	0	Weaving:	0	0	0
Other:	0	0	0	Other:	0	0	0
Unknown:	0	0	0	Unknown:	0	0	0
Total:	23	5	0	Total:	23	5	0

Contributing Factor	Veh 1	Veh 2	Veh 3	Direction	Veh 1	Veh 2	Veh 3
No Apparent Contributing Factor:	2	4	0	North:	15	2	0
Asleep at the Wheel:	0	0	0	Northeast:	0	0	0
Illness:	0	0	0	East:	0	0	0
Distracted by Passenger:	0	0	0	Southeast:	0	0	0
Driver Inexperience:	0	0	0	South:	8	3	0
Driver Fatigue:	0	0	0	Southwest:	0	0	0
Driver Preoccupied:	2	0	0	West:	0	0	0
Driver Unfamiliar with Area:	0	0	0	Northwest:	0	0	0
Driver Emotionally Upset:	0	0	0	Unknown:	0	0	0
Evading Law Enforcement Officer:	0	0	0	Total:	23	5	0
Physical Disability:	0	0	0				
Unknown:	19	1	0				
Total:	23	5	0				

Condition of Driver	Veh 1	Veh 2	Veh 3
No Impairment Suspected:	20	5	0
Alcohol Involved:	1	0	0
RX, Medication, or Drugs Involved:	0	0	0
Illegal Drugs Involved:	0	0	0
Alcohol and Drugs Involved:	0	0	0
Driver/Pedestrian not Observed:	0	0	0
Unknown:	2	0	0
Total:	23	5	0

ADT: 7,006 Length: 1.30



Example Project #4 State Highway 36 MP 3.60 to 6.00 2008-2012

Jake Kononov, P.E. Ph.D.
Bryan K. Allery, P.E.

hwy	mp	date	time	severity	location	road_desc	acctype	driver_1
0036A	3.92	11/27/2011	1345	PDO	ON	NON-INTERSECTION	EMBANKMENT CUT/FILL SLOPE	NO IMPAIRMENT
0036A	4.10	8/15/2008	1340	INJ	OFF RIGHT	NON-INTERSECTION	OVERTURNING	NO IMPAIRMENT
0036A	4.10	12/30/2009	1310	PDO	OFF RIGHT	NON-INTERSECTION	EMBANKMENT CUT/FILL SLOPE	NO IMPAIRMENT
0036A	4.17	8/18/2010	2245	PDO	ON	NON-INTERSECTION	GUARD RAIL	NO IMPAIRMENT
0036A	4.20	7/23/2008	2043	INJ	OFF RIGHT	NON-INTERSECTION	OVERTURNING	NO IMPAIRMENT
0036A	4.50	8/8/2008	2300	INJ	ON	NON-INTERSECTION	CONCRETE BARRIER	UNKNOWN
0036A	4.50	4/6/2009	1702	PDO	UNKNOWN	NON-INTERSECTION	CONCRETE BARRIER	NO IMPAIRMENT
0036A	4.55	1/12/2010	2015	PDO	OFF RIGHT	NON-INTERSECTION	EMBANKMENT CUT/FILL SLOPE	NO IMPAIRMENT
0036A	4.58	9/24/2011	1000	INJ	OFF RIGHT	NON-INTERSECTION	OVERTURNING	NO IMPAIRMENT
0036A	4.60	9/3/2012	1045	INJ	ON	NON-INTERSECTION	OVERTURNING	NO IMPAIRMENT
0036A	4.60	7/31/2008	2200	INJ	OFF RIGHT	NON-INTERSECTION	TREE/SHRUBBERY	NO IMPAIRMENT
0036A	4.60	7/25/2008	1650	PDO	OFF RIGHT	NON-INTERSECTION	EMBANKMENT CUT/FILL SLOPE	NO IMPAIRMENT
0036A	4.60	9/14/2012	1130	INJ	OFF RIGHT	NON-INTERSECTION	LARGE BOULDERS OR ROCKS	NO IMPAIRMENT
0036A	4.62	9/16/2011	1645	INJ	ON	NON-INTERSECTION	OVERTURNING	NO IMPAIRMENT
0036A	4.66	6/16/2010	1000	PDO	ON	NON-INTERSECTION	OVERTURNING	NO IMPAIRMENT
0036A	4.67	2/27/2009	1545	PDO	UNKNOWN	NON-INTERSECTION	OVERTURNING	NO IMPAIRMENT
0036A	4.78	1/17/2010	0815	INJ	OFF LEFT	NON-INTERSECTION	OVERTURNING	NO IMPAIRMENT
0036A	4.81	11/26/2008	0824	PDO	UNKNOWN	NON-INTERSECTION	OVERTURNING	NO IMPAIRMENT
0036A	4.86	11/26/2008	0830	INJ	UNKNOWN	NON-INTERSECTION	OVERTURNING	NO IMPAIRMENT
0036A	5.44	9/24/2012	0145	PDO	OFF LEFT	NON-INTERSECTION	OVERTURNING	NO IMPAIRMENT
0036A	5.56	2/6/2010	0052	PDO	OFF LEFT	NON-INTERSECTION	EMBANKMENT CUT/FILL SLOPE	NO IMPAIRMENT

SH36A					
From:	3.60	Length:	2.40	From:	1/1/2008
To:	6.00	AADT:	1,192	To:	12/31/2012

Dispersion Parameter (α) RFRR2UH		
Inj:		1.462
Total:		1.435

Weight

$$W = \frac{1}{1 + \frac{(\mu \times n)}{\phi}}$$

$$\phi = 1/\alpha$$

EB Estimate

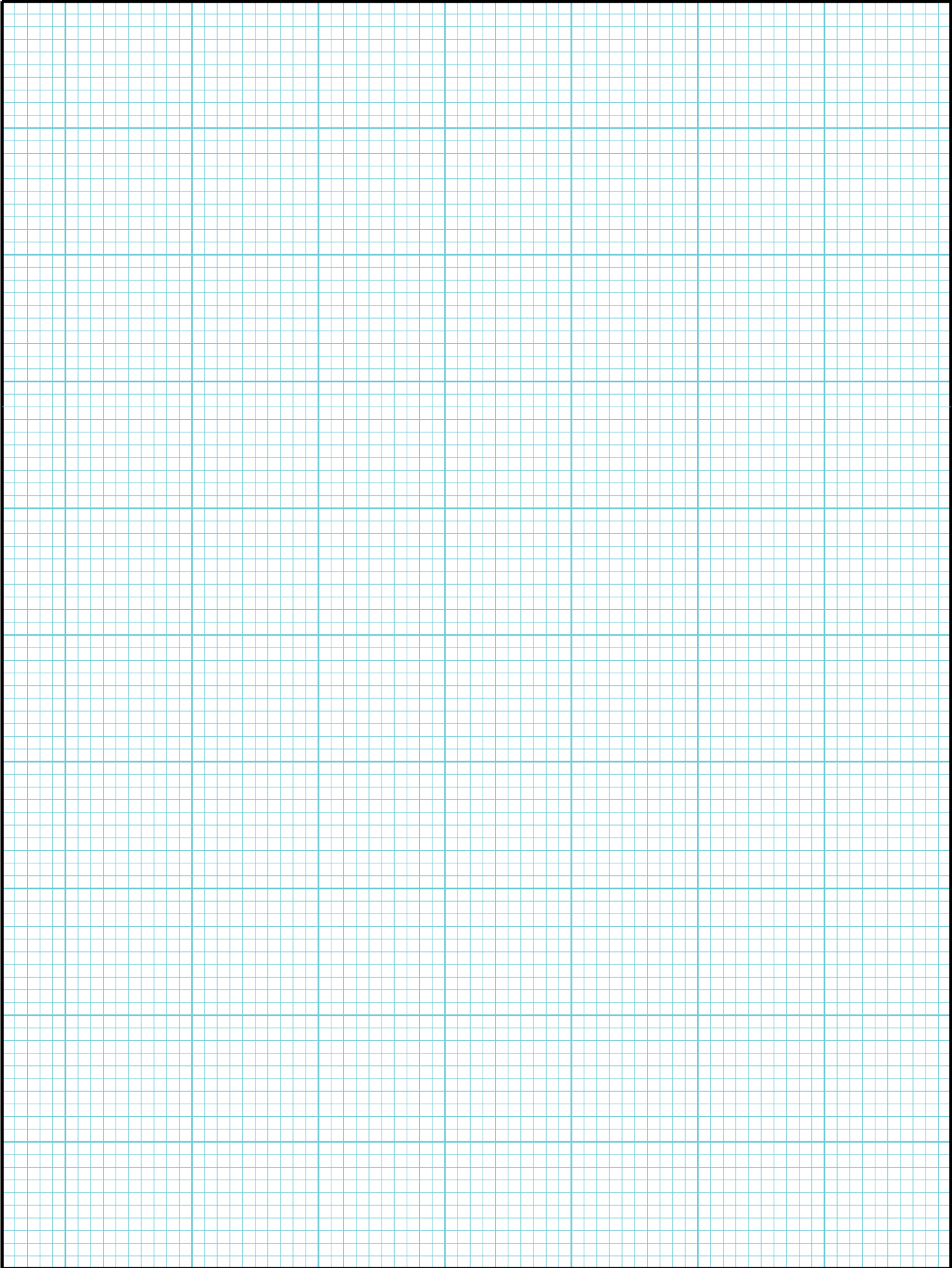
$$EB_{Est} = W \times \mu + (1 - W) \times \eta$$

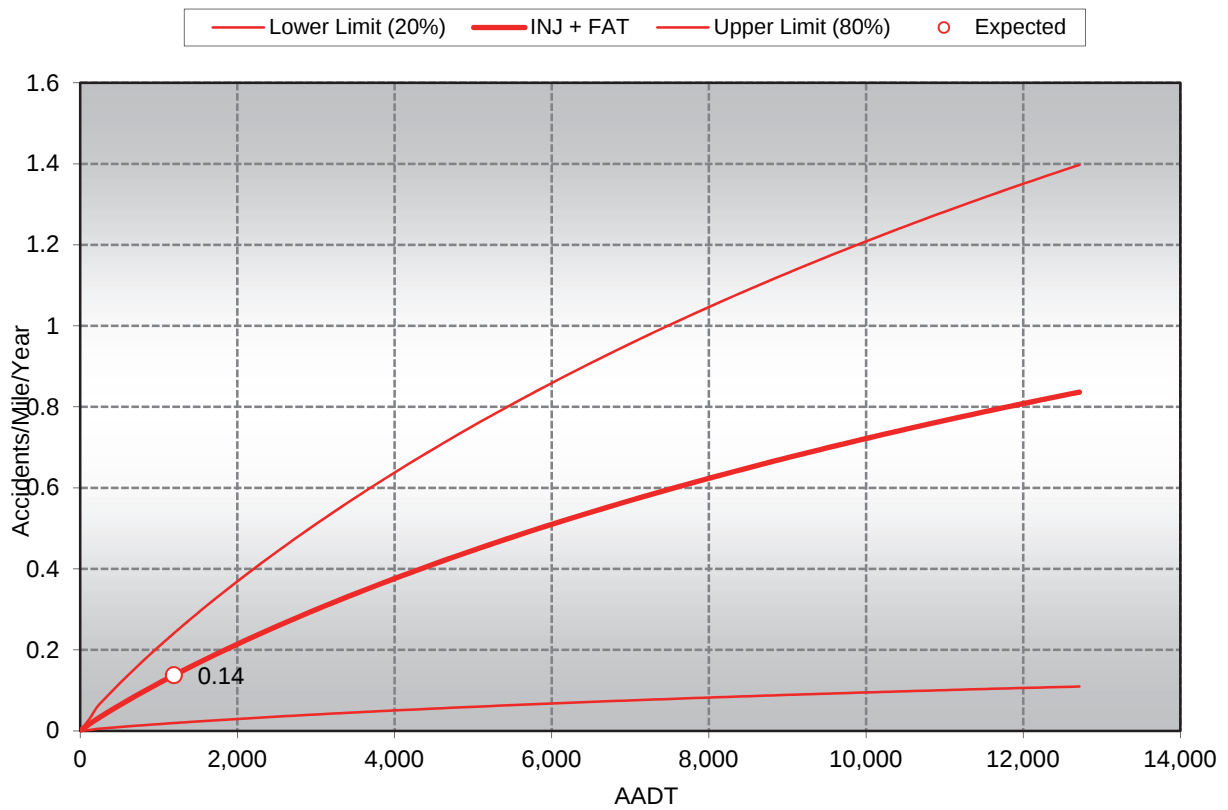
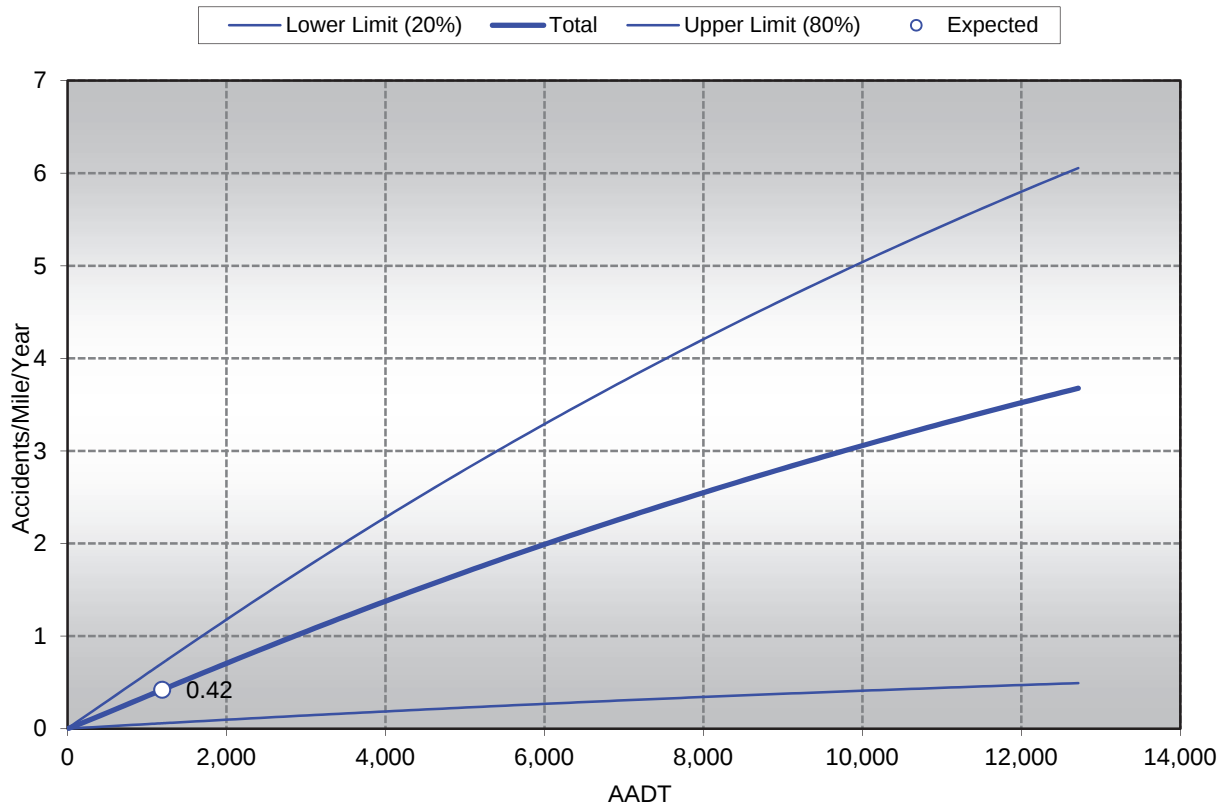
μ = Predicted by SPF

η = Number of Observed Crashes/Mile/Year

α = Dispersion Parameter from SPF Model

$$\phi = 1/\alpha$$





Montana Rural Flat and Rolling 2-Lane Undivided Highways								
Description	0 - 3000 ADT		3000 - 8000 ADT		> 8000 ADT		All Totals	
	Accidents	Percent	Accidents	Percent	Accidents	Percent	Accidents	Percent
Severity								
PDO	6,951	66.96%	2,320	73.14%	470	76.42%	9,741	68.75%
INJ	3,157	30.41%	798	25.16%	140	22.76%	4,095	28.90%
FAT	273	2.63%	54	1.70%	5	0.81%	332	2.34%
Persons Injured	4,585	N/A	1,124	N/A	214	N/A	5,923	N/A
Persons Killed	307	N/A	62	N/A	6	N/A	375	N/A
Number of Vehicles								
Single Vehicle Accidents	9,079	87.46%	2,487	78.40%	388	63.09%	11,954	84.37%
Two Vehicle Accidents	1,217	11.72%	622	19.61%	194	31.54%	2,033	14.35%
Three or more Vehicle Accident	85	0.82%	63	1.99%	33	5.37%	181	1.28%
Unknown Number of Vehicles	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Location								
On Road	5,524	53.21%	1,947	61.38%	427	69.43%	7,898	55.75%
Off Road	3,041	29.29%	671	21.15%	82	13.33%	3,794	26.78%
Off Road Left	1,275	12.28%	242	7.63%	31	5.04%	1,548	10.93%
Off Road Right	1,766	17.01%	429	13.52%	51	8.29%	2,246	15.85%
Off Road at Tee	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Off Road in Median	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Unknown Road Location	1,816	17.49%	554	17.47%	106	17.24%	2,476	17.48%
Accident Type								
Overturning	2,968	28.59%	490	15.45%	53	8.62%	3,511	24.78%
Other Non Collision	337	3.25%	98	3.09%	8	1.30%	443	3.13%
School Age Pedestrians	0	0.00%	0	0.00%	0	0.00%	0	0.00%
All Other Pedestrians	18	0.17%	9	0.28%	0	0.00%	27	0.19%
Broadside	152	1.46%	82	2.59%	21	3.41%	255	1.80%
Head On	135	1.30%	71	2.24%	15	2.44%	221	1.56%
Rear End	396	3.81%	281	8.86%	135	21.95%	812	5.73%
Sideswipe (Same Direction)	191	1.84%	53	1.67%	14	2.28%	258	1.82%
Sideswipe (Opposite Direction)	241	2.32%	95	2.99%	20	3.25%	356	2.51%
Approach Turn	7	0.07%	7	0.22%	4	0.65%	18	0.13%
Overtaking Turn	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Parked Motor Vehicle	29	0.28%	12	0.38%	2	0.33%	43	0.30%
Railway Vehicle	4	0.04%	1	0.03%	0	0.00%	5	0.04%
Bicycle	2	0.02%	1	0.03%	0	0.00%	3	0.02%
Motorized Bicycle	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Domestic Animal	468	4.51%	55	1.73%	5	0.81%	528	3.73%
Wild Animal	2,653	25.56%	1,127	35.53%	229	37.24%	4,009	28.30%
Light or Utility Pole	88	0.85%	46	1.45%	7	1.14%	141	1.00%
Traffic Signal Pole	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Sign	67	0.65%	21	0.66%	3	0.49%	91	0.64%
Bridge Rail	44	0.42%	10	0.32%	3	0.49%	57	0.40%
Guard Rail	472	4.55%	126	3.97%	9	1.46%	607	4.28%
Cable Rail	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Median Barrier	38	0.37%	3	0.09%	4	0.65%	45	0.32%
Bridge Abutment	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Column or Pier	14	0.13%	6	0.19%	14	2.28%	22	0.16%
Culvert or Headwall	52	0.50%	10	0.32%	3	0.49%	65	0.46%
Embankment	897	8.64%	229	7.22%	26	4.23%	1,152	8.13%
Curb	4	0.04%	0	0.00%	0	0.00%	4	0.03%
Delineator Post	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Fence	352	3.39%	89	2.81%	13	2.11%	454	3.20%
Tree	257	2.48%	80	2.52%	9	1.46%	346	2.44%
Large Boulder	45	0.43%	12	0.38%	0	0.00%	57	0.40%
Rocks in Roadway	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Barricade	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Wall or Building	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Crash Cushion	5	0.05%	2	0.06%	1	0.16%	8	0.06%
Mailbox	22	0.21%	13	0.41%	3	0.49%	38	0.27%
Other Fixed Object	204	1.97%	42	1.32%	11	1.79%	257	1.81%
Involving Other Object	87	0.84%	60	1.89%	4	0.65%	151	1.07%
Road Maintenance Equipment	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Unknown Accident Type	132	1.27%	41	1.29%	11	1.79%	184	1.30%
Total Fixed Objects	2,561	24.67%	689	21.72%	94	15.28%	3,344	23.60%
Total Other Objects	87	0.84%	60	1.89%	4	0.65%	151	1.07%

Montana Rural Flat and Rolling 2-Lane Undivided Highways								
Description	0 - 3000 ADT		3000 - 8000 ADT		> 8000 ADT		All Totals	
	Accidents	Percent	Accidents	Percent	Accidents	Percent	Accidents	Percent
Lighting								
Daylight	5,500	52.98%	1,539	48.52%	315	51.22%	7,354	51.91%
Dawn or Dusk	730	7.03%	208	6.56%	47	7.64%	985	6.95%
Dark - Lighted	108	1.04%	58	1.83%	16	2.60%	182	1.28%
Dark - Unlighted	4,018	38.71%	1,359	42.84%	236	38.37%	5,613	39.62%
Unknown Lighting	25	0.24%	8	0.25%	1	0.16%	34	0.24%
Weather								
No Adverse Weather	8,446	81.36%	2,595	81.81%	516	83.90%	11,557	81.57%
Rain	361	3.48%	112	3.53%	24	3.90%	497	3.51%
Snow or Sleet or Hail	1,312	12.64%	404	12.74%	68	11.06%	1,784	12.59%
Fog	115	1.11%	31	0.98%	5	0.81%	151	1.07%
Dust	3	0.03%	0	0.00%	0	0.00%	3	0.02%
Wind	117	1.13%	17	0.54%	2	0.33%	136	0.96%
Unknown Weather	27	0.26%	13	0.41%	0	0.00%	40	0.28%
Road Condition								
Dry Road	7,062	68.03%	2,128	67.09%	418	67.97%	9,608	67.81%
Wet Road	742	7.15%	294	9.27%	68	11.06%	1,104	7.79%
Muddy Road	11	0.11%	2	0.06%	3	0.49%	16	0.11%
Snowy Road	1,078	10.38%	333	10.50%	44	7.15%	1,455	10.27%
Icy Road	1,330	12.81%	393	12.39%	80	13.01%	1,803	12.73%
Slushy Road	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Foreign Material Road	0	0.00%	1	0.03%	0	0.00%	1	0.01%
With Road Treatment	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Dry with Icy Road Treatment	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Wet with Icy Road Treatment	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Snowy with Icy Road Treatment	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Icy with Icy Road Treatment	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Slushy with Icy Road Treatment	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Unknown Road Condition	158	1.52%	21	0.66%	2	0.33%	181	1.28%
Contributing Factor								
No Apparent Contributing Factor	1,768	17.03%	699	22.04%	137	22.28%	2,604	18.38%
Asleep at the Wheel	284	2.74%	65	2.05%	4	0.65%	353	2.49%
Illness	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Distracted by Passenger	2	0.02%	1	0.03%	2	0.33%	5	0.04%
Driver Inexperience	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Driver Fatigue	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Driver Preoccupied	528	5.09%	129	4.07%	34	5.53%	691	4.88%
Driver Unfamiliar with Area	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Driver Emotionally Upset	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Evading Law Enforcement Officer	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Physical Disability	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Unknown Contributing Factor	7,799	75.13%	2,278	71.82%	438	71.22%	10,515	74.22%
Condition of Driver								
No Impairment Suspected	8,646	83.29%	2,724	85.88%	568	92.36%	11,938	84.26%
Alcohol Involved	1,070	10.31%	278	8.76%	37	6.02%	1,385	9.78%
RX Drugs or Medication Involved	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Illegal Drugs Involved	65	0.63%	35	1.10%	1	0.16%	101	0.71%
Alcohol and Drugs Involved	184	1.77%	48	1.51%	5	0.81%	237	1.67%
Driver/Pedestrian Not Observed	52	0.50%	12	0.38%	0	0.00%	64	0.45%
Unknown Condition	364	3.51%	75	2.36%	4	0.65%	443	3.13%
Total Accidents:	10,381	73.27%	3,172	22.39%	615	4.34%	14,168	100.00%



Montana Department of Transportation
DiExSys™ Roadway Safety Systems
Detailed Accident Summary Report

11/03/2013

Job #: 20131103130920

Location: 36A		Begin: 3.60	End: 6.00	From: 01/01/2008	To: 12/31/2012
Severity		Accident Type			
PDO: 11		Overturning: 11		Bridge Abutment: 0	
INJ: 10	11 :Injured	Other Non Collision: 0		Column/Pier: 0	
FAT: 0	0 :Killed	Pedestrians: 0		Culvert/Headwall: 0	
Total: 21		Broadside: 0		Embankment: 5	
		Head On: 0		Curb: 0	
		Rear End: 0		Delineator Post: 0	
		Sideswipe (Same): 0		Fence: 0	
		Sideswipe (Opposite): 0		Tree: 1	
		Approach Turn: 0		Large Boulders or Rocks: 1	
		Overtaking Turn: 0		Barricade: 0	
		Parked Motor Vehicle: 0		Wall/Building: 0	
		Railway Vehicle: 0		Crash Cushion: 0	
		Bicycle: 0		Mailbox: 0	
		Motorized Bicycle: 0		Other Fixed Object: 0	
		Domestic Animal: 0		Total Fixed Objects: 10	
		Wild Animal: 0		Rocks in Roadway: 0	
		Light/Utility Pole: 0		Vehicle Cargo/Debris: 0	
		Traffic Signal Pole: 0		Road Maintenance Equipment: 0	
		Sign: 0		Involving Other Object: 0	
		Bridge Rail: 0		Total Other Objects: 0	
		Guard Rail: 1		Unknown: 0	
		Cable Rail: 0		Total: 21	
		Concrete Barrier: 2			
Number of Vehicles		Mainline/Ramps/Frontage Roads			
One Vehicle: 21		Mainline: 21	Frontage/Ramp Intersections		
Two Vehicles: 0		Crossroad (A): 0	M: 0	N: 0	O: 0 P: 0
Three or More: 0					
Unknown: 0					
Total: 21					
		Ramps			
		B: 0 F: 0 J: 0	Left Frontage Rd (L): 0		
		C: 0 G: 0 K: 0	Rt Frontage Rd (R): 0		
		D: 0 H: 0 L: 0	HOV Lanes (V): 0		
		E: 0 I: 0	Unknown: 0		
			Total: 21		
Location		Road Description			
On Road: 6		At Intersection: 0			
Off Road Left: 3		At Driveway Access: 0			
Off Road Right: 8		Intersection Related: 0			
Off Road at Tee: 0		Non Intersection: 21			
Off in Median: 0		In Alley: 0			
Unknown: 4		Roundabout: 0			
Total: 21		Ramp: 0			
		Parking Lot: 0			
		Unknown: 0			
		Total: 21			
Lighting Conditions		Road Conditions			
Daylight: 15		Dry: 13			
Dawn or Dusk: 0		Wet: 3			
Dark - Lighted: 0		Muddy: 1			
Dark - Unlighted: 6		Snowy: 0			
Unknown: 0		Icy: 4			
Total: 21		Slushy: 0			
		Foreign Material: 0			
		With Road Treatment: 0			
		Dry w/Icy Road Treatment: 0			
		Wet w/Icy Road Treatment: 0			
		Snowy w/Icy Road Treatment: 0			
		Icy w/Icy Road Treatment: 0			
		Slushy w/Icy Road Treatment: 0			
		Unknown: 0			
		Total: 21			
Weather Conditions					
None: 18					
Rain: 2					
Snow/Sleet/Hail: 1					
Fog: 0					
Dust: 0					
Wind: 0					
Unknown: 0					
Total: 21					
Accident Rates					
PDO: 2.10 *	* MVMT				
INJ: 1.91 *	** 100 MVMT				
FAT: 0.00 **	Total: 4.02 *				

ADT: 1,192 Length: 2.40



Montana Department of Transportation
DiExSys™ Roadway Safety Systems
Detailed Accident Summary Report

11/03/2013

Job #: 20131103130920

Location: 36A Begin: 3.60 End: 6.00 From: 01/01/2008 To: 12/31/2012

Vehicle Type	Veh 1	Veh 2	Veh 3	Vehicle Movement	Veh 1	Veh 2	Veh 3
Passenger Car/Van:	9	0	0	Going Straight:	21	0	0
Passenger Car/Van w/Trl:	0	0	0	Slowing:	0	0	0
Pickup Truck/Utility Van:	4	0	0	Stopped in Traffic:	0	0	0
Pickup Truck/Utility Van w/Trl:	0	0	0	Making Right Turn:	0	0	0
Truck 10k lbs or Less:	0	0	0	Making Left Turn:	0	0	0
Trucks > 10k lbs/Bus > 15 People:	1	0	0	Making U-Turn:	0	0	0
School Bus < 15 People:	0	0	0	Passing:	0	0	0
Non School Bus < 15 People:	0	0	0	Backing:	0	0	0
Motorhome:	0	0	0	Enter/Leave Parked Position:	0	0	0
Motorcycle:	3	0	0	Starting in Traffic:	0	0	0
Bicycle:	0	0	0	Parked:	0	0	0
Motorized Bicycle:	0	0	0	Changing Lanes:	0	0	0
Farm Equipment:	0	0	0	Avoiding Object/Veh in Road:	0	0	0
Hit and Run - Unknown:	0	0	0	Weaving:	0	0	0
Other:	0	0	0	Other:	0	0	0
Unknown:	0	0	0	Unknown:	0	0	0
Total:	21	0	0	Total:	21	0	0

Contributing Factor	Veh 1	Veh 2	Veh 3	Direction	Veh 1	Veh 2	Veh 3
No Apparent Contributing Factor:	1	0	0	North:	1	0	0
Asleep at the Wheel:	0	0	0	Northeast:	0	0	0
Illness:	0	0	0	East:	1	0	0
Distracted by Passenger:	0	0	0	Southeast:	0	0	0
Driver Inexperience:	0	0	0	South:	16	0	0
Driver Fatigue:	0	0	0	Southwest:	0	0	0
Driver Preoccupied:	4	0	0	West:	3	0	0
Driver Unfamiliar with Area:	0	0	0	Northwest:	0	0	0
Driver Emotionally Upset:	0	0	0	Unknown:	0	0	0
Evading Law Enforcement Officer:	0	0	0	Total:	21	0	0
Physical Disability:	0	0	0				
Unknown:	16	0	0				
Total:	21	0	0				

Condition of Driver	Veh 1	Veh 2	Veh 3
No Impairment Suspected:	20	0	0
Alcohol Involved:	0	0	0
RX, Medication, or Drugs Involved:	0	0	0
Illegal Drugs Involved:	0	0	0
Alcohol and Drugs Involved:	0	0	0
Driver/Pedestrian not Observed:	0	0	0
Unknown:	1	0	0
Total:	21	0	0

ADT: 1,192 Length: 2.40



Montana Safety Knowledge Base



Technical Report and Documentation

Prepared by DiExSys, LLC
October 2013

DiExSys, LLC
8608 W Mountain View Lane, Littleton, CO 80125



October 20, 2013

Kraig McLeod, P.E.
Traffic Safety Engineer
Montana DOT

Dear Kraig:

Re: DEVELOPMENT OF MONTANA-SPECIFIC SAFETY KNOWLEDGE BASE

DiExSys, LLC is very pleased to submit this report intended to assist Montana Department of Transportation (MDT) with providing the highest level of safety possible on the Montana highways with construction funds available. This report is comprised of documentation related to the development of the Montana-Specific Safety Knowledge Base. It is intended to be used in the development of Montana Roadway Departure Safety Implementation Plan and in providing decision support analysis on other safety-motivated projects. .

We would like to express our gratitude to the MDT staff and management for the valuable assistance provided during the course of the work. DiExSys LLC sincerely appreciates the opportunity to conduct this important study and be of service to the Montana Department of Transportation.

Respectfully submitted,

DiExSys, LLC

A handwritten signature in blue ink, appearing to read "Kononov", written over a horizontal line.

Jake Kononov, P.E., Ph.D.

A handwritten signature in blue ink, appearing to read "B.K. Allery", written over a horizontal line.

Bryan K. Allery, P.E.

Montana Specific Safety Knowledge Base Report

October 2013



Reproduction of any Portion of this Document is Prohibited without Expressed Written Authority from the Montana Department of Transportation

Montana Specific Safety Knowledge Base Report

Table of Contents

EXECUTIVE SUMMARY	1
STATEMENT OF PHILOSOPHY	3
OBJECTIVES.....	3
SAFETY PERFORMANCE FUNCTIONS	4
Segment Dataset Preparation.....	4
Model Development	5
Choice of the Model Form.....	5
Choice of Underlying Distributional Assumptions	6
Model Fitting and Goodness of Fit	6
CORRECTING FOR THE REGRESSION TO THE MEAN (RTM) BIAS	27
LEVEL OF SERVICE OF SAFETY (LOSS)	30
Concept Description.....	30
Calibration of the LOSS Boundaries	31
PATTERN RECOGNITION AND DIRECT DIAGNOSTICS METHODOLOGIES	33
Application of Pattern Recognition Methodology	35
CONCLUSIONS.....	40
APPENDIX.....	41



Montana Specific Safety Knowledge Base Appendix

Table of Contents

SPF and Level of Service of Safety Boundary Tables and Diagnostic Norms

Rural Flat and Rolling 2-Lane Undivided Highways.....	17 Pages
Rural Flat and Rolling 2-Lane Undivided Highways (ROR)	17 Pages
Rural Flat and Rolling 4-Lane Divided Freeways.....	27 Pages
Rural Flat and Rolling 4-Lane Divided Freeways (ROR)	27 Pages
Rural Mountainous 2-Lane Undivided Highways	9 Pages
Rural Mountainous 2-Lane Undivided Highways (ROR).....	9 Pages
Rural Mountainous 4-Lane Divided Freeways	17 Pages
Urban 4-Lane Divided Freeways	27 Pages
Rural Flat and Rolling 4-Lane Divided Highways.....	21 Pages

This report is prepared solely for the purpose of identifying, evaluating and planning safety improvements on public roads in Montana. It is subject to the provisions of 23 U.S.C.A. 409, and therefore is not subject to discovery and is excluded from evidence. Applicable provisions of 23 U.S.C.A. 409 are cited below:

Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential accident sites, hazardous roadway conditions, or railway-highway crossings, pursuant to sections 130, 144, and 152 of this title or for the purpose of developing any highway safety construction improvement project which may be implemented utilizing Federal-aid highway funds shall not be subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists or data.

Any intentional or inadvertent release of this report, or any data derived from its use shall not constitute a waiver of privilege pursuant to 23 U.S.C.A. 409.

EXECUTIVE SUMMARY

This report describes the development of the Montana-Specific Safety Knowledge Base. Use of this knowledge base will enable Montana Department of Transportation (MDT) to identify existing safety problems with greater accuracy and effectiveness. Data driven approach to solving safety problems presented in this report is based on the development and application of the Montana-specific predictive and diagnostic tools. These analytical tools are intended to be used in the development of the Roadway Departure Safety Implementation Plan as well as in providing decision support analysis on other safety-motivated projects. DiExSys process provides a platform for the project level decision support analysis, planning of system level improvements and risk management. When applied statewide, this approach is expected to optimize safety benefits within the constraints of construction budget allocations. Use of the proposed methodology is intended to assist MDT management and staff in making decisions effecting safety of the traveling public. The work on the development of Montana--Specific Safety Knowledge Base includes the following:

Calibration of the Safety Performance Functions (SPF), Calibration of the Level of Service of Safety (LOSS) Boundaries and Development of Diagnostic Menus for the highway segments of Following Facilities:

- Rural Flat and Rolling 2-Lane Highways
- Rural Flat and Rolling 2-Lane Highways (Run off the Road Only Crashes)
- Rural Flat and Rolling 4-Lane Highways
- Rural Flat and Rolling Freeways
- Rural Flat and Rolling Freeways (Run off the Road Only Crashes)
- Rural Mountainous 2-Lane Highways
- Rural Mountainous 2-Lane Highways (Run off the Road Only Crashes)
- Rural Mountainous 4-Lane Freeways
- Urban 4-Lane Freeways

The primary use of SPF is to assess the magnitude of the safety problem while diagnostic menus and pattern recognition analysis are used to identify its nature. Both will be used in the development of the Roadway Departure Safety Implementation Plan and in providing safety decision support analysis on all projects at the Montana DOT.

Development of the SPF lends itself well to the conceptual formulation of *Level of Service of Safety* (LOSS). The level of service concept uses qualitative and quantitative measures that characterize the safety of a segment in reference to its expected performance. If the level of safety predicted by the SPF will represent a normal or expected number of accidents at a specific level of AADT, then the degree of deviation from the norm was stratified to represent specific levels of safety.

- LOSS I - Indicates low potential for accident reduction
- LOSS II - Indicates low to moderate potential for accident reduction
- LOSS III - Indicates moderate to high potential for accident reduction
- LOSS IV - Indicates high potential for accident reduction

Application of the LOSS concept to Montana highways enables MDT to do the following:

- Qualitatively and quantitatively describe the degree of safety or un-safety of Montana Highways

- Effectively communicate the magnitude of the safety problem to other professionals and elected officials
- Bring the perception of roadway safety in line with the reality of safety performance of different road types in Montana.
- Provide a frame of reference for decision making on non-safety motivated projects (resurfacing, reconstruction or widening, for instance)
- Provide a frame of reference from a safety perspective for planning major corridor improvements

Application of the pattern recognition analysis statewide enables MDT to identify crash patterns that may be susceptible to cost-effective correction. It is important to realize that crash patterns may be present with and without elevated crash frequency reflected by the LOSS-III and IV categories. Diagnostic analysis and subsequent construction of safety improvements at sites that can be identified by the LOSS and pattern recognition analyses are expected to result in significant and cost-effective accident reduction.



STATEMENT OF PHILOSOPHY

The efficient and responsible investment of resources in addressing safety problems is a difficult task. Since crashes occur on all highways in use, it is inappropriate to say of any highway that it is safe. However, it is correct to say that highways can be built to be safer or less safe. Road safety is a matter of degree. When making decisions effecting road safety it is critical to understand that expenditure of limited available funds on improvements in places where it prevents few injuries and saves few lives can mean that injuries will occur and lives will be lost by not spending them in places where more accidents could have been prevented¹. It is Montana Department of Transportation (MDT)' objective to maximize accident reduction within the limitations of available budgets by making road safety improvements at locations where it does the most good or prevents the most accidents.

OBJECTIVES

The primary objective of this report is to develop Montana-Specific Safety Knowledge Base intended to assist MDT staff with maximizing safety improvements on Montana highways within constraints of available construction budgets. Montana-Specific Safety Knowledge Base is comprised of predictive tools in the form of Safety Performance Functions and diagnostic tools in the form of diagnostic menus and pattern recognition algorithms. DiExSys approach presented in this report is based on sophisticated yet highly practical methodology designed to provide decision support analysis for solving roadway safety problems at the system and project levels. The decision support analysis is provided through integration of elements of geometric design, traffic operations, statistical modeling, pattern recognition, risk analysis and economics. This methodology also provides a platform for the planning of system level improvements, decision support analysis at the project level and risk management. The work elements include Calibration of the Safety Performance Functions (SPF), Calibration of the Level of Service of Safety (LOSS) Boundaries and Development of Diagnostic Menus for the highway segments of Following Facilities:

- Rural Flat and Rolling 2-Lane Highways
- Rural Flat and Rolling 2-Lane Highways (Run off the Road Only Crashes)
- Rural Flat and Rolling 4-Lane Highways
- Rural Flat and Rolling Freeways
- Rural Flat and Rolling Freeways (Run off the Road Only Crashes)
- Rural Mountainous 2-Lane Highways
- Rural Mountainous 2-Lane Highways (Run off the Road Only Crashes)
- Rural Mountainous 4-Lane Freeways
- Urban 4-Lane Freeways

¹ Hauer, E., (1999) Safety Review of Highway 407: Confronting Two Myths. TRB

SAFETY PERFORMANCE FUNCTIONS

Segment Dataset Preparation

All of the dataset preparation was performed using the Montana Department of Transportation (MDT) accident database. Accident history for each facility was prepared over the period of 5 years. Annual Average Daily Traffic (AADT) for each roadway segment for each of the 5 years was entered into the same dataset; intersection related accidents were removed prior to fitting of the model. Isolating a distance of approximately 250 ft. on both sides of rural intersections is a conservative measure, but it will ensure that intersection related conflicts will not pollute the data-set comprised of non-intersection related accidents and road segments. Figure 1 illustrates how segments datasets were prepared. For freeways, all of the interchange related accidents including accidents, which occurred on ramps, and crossroads were removed from the accident database prior to fitting the model. The reason for removing ramp and cross road accidents was isolate main line only crashes required for the development of Freeway Safety Performance Functions. Figure 2 illustrates how freeway segments datasets were prepared.

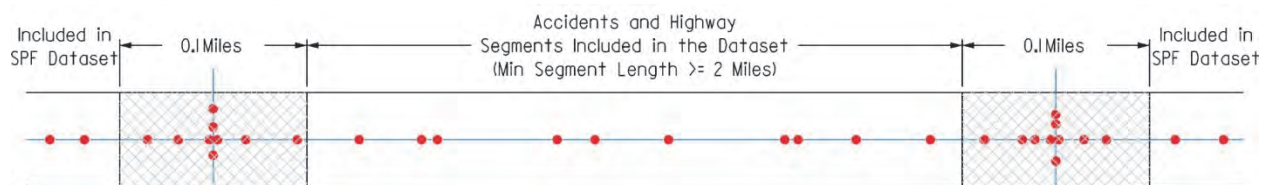


Figure 1 – Dataset Preparation for Rural Highways

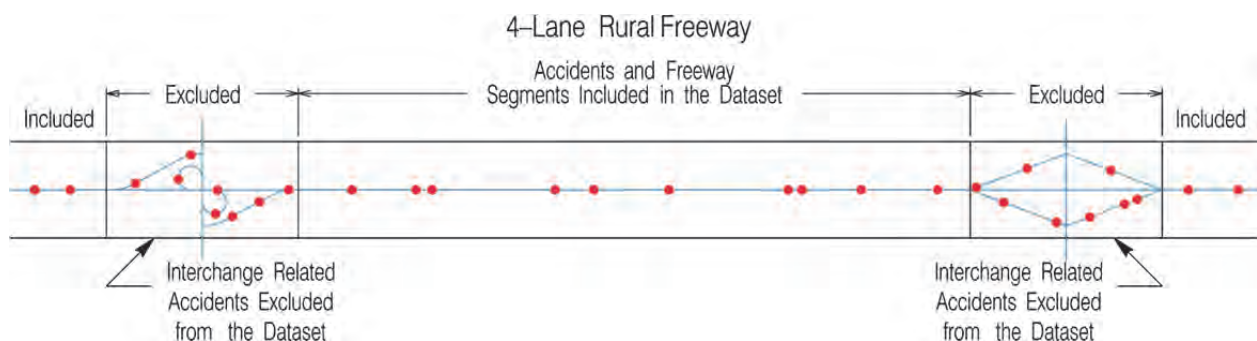


Figure 2 – Dataset Model for 4-Lane Interstates

Considering that the focus of this effort is on the Run Off the Road (ROR) crashes, Safety Performance Functions (SPF-ROR) for ROR only crashes on were also calibrated for the following facilities: 2-Lane Rural Flat and Rolling Highways, 4-Lane Rural Flat and Rolling Divided Freeways, 2-Lane Mountainous Highways. The datasets were prepared as described above, however the crash types in the ROR datasets were limited only to the following: overturning, fixed object, head-on and sideswipe-opposite crashes. All other crash types were filtered out prior to regression.

Model Development

This project develops Safety Performance Functions (SPFs) for the freeway and highway segments in Montana. SPFs in essence are accident prediction models, which generally relate traffic exposure measured in AADT to safety measured in the number of accidents over a unit of time. In statistical modeling of traffic accidents, we are interested in discovering what we can learn about underlying relationships from empirical data containing a random component. We suppose that some complex phenomenon manifested by accident occurrence (data generating mechanism) has produced the observations and we wish to describe it by some simpler, but still realistic, model that reveals the nature of the underlying relationship. Lindsey² observed that in a model we distinguish between systematic and random variability, where the former describes the patterns of the phenomenon in which we are particularly interested. A great deal of substantive and comprehensive work in the area of accident modeling was done by Miaou and Lum³, Hauer and Persaud,⁴ Hauer⁵ as well as others. The following is a brief description of modeling methodology used in this project using Generalized Linear Models (GLM). Two kinds of Safety Performance Functions were calibrated. The first one addresses the total number of accidents and the second one looks only at accidents involving an injury or fatality. It allows us to assess the magnitude of the safety problem from the frequency and severity standpoint.

Choice of the Model Form

Based on substantial empirical evidence derived from observing safety performance of various roads over extended time periods as well as work of other researchers the following understanding of relationship between safety and exposure has emerged. Accident rates decline when AADT reaches certain threshold endemic to a particular facility. This understanding suggests a choice of underlying sigmoidal function, which would reflect this phenomenon, however Montana highways are generally characterized by low AADT and in some cases do not reach this threshold. Sigmoidal function, however, is very flexible nonlinear model; it lends itself well to capturing the overall shape of observed data. General model form of a sigmoidal function used in this application is provided below:

$$E(y) = l \left(\beta_{Min} + \frac{\beta_{max}(X^{\beta_0})}{X^{\beta_0} + \beta_1^{\beta_0}} \right)$$

In this $E(y)$ is the number of accidents expected to occur on a segment of road, X is the independent variable (here AADT), l is the length of segment and β are parameters to be estimated. It was used for most SPF models; however, for some SPFs reflecting run off the road only crashes the Hoerl function was used, because of its ability to represent the reduction in the number of the run off the road crashes related to the increase in AADT. The Hoerl function is provided below:

$$E(y) = l \beta_0(X)^{\beta_1} e^{\beta_2 X}$$

Where X is the AADT, l is the segment length and β are model parameters for the Hoerl function.

² Lindsey, J.K. *Applying Generalized Linear Models*. Springer-Verlag, New York, 1997.

³ Miaou S. & Lum H. (1993). Modeling Vehicle Accidents and Highway Geometric Design Relationships. *Accident Analysis & Prevention* 25(6):689-709.

⁴ Hauer, E. & Persaud, B. *Safety Analysis of Roadway Geometric and Ancillary Features*. Transportation Association of Canada 1997.

⁵ Hauer, E. (1996). Identification of sites with Promise. *Transportation Research Record* 1542. 54-59.

Choice of the Underlying Distributional Assumptions

In statistical modeling of traffic accidents, it is assumed that the random variation follows certain probability laws and can be characterized by a probability function. Miaou and Lum⁴ observed that “The use of a continuous distribution, such as the normal distribution, is at best an approximation to a truly discrete process. The Poisson distribution, on the other hand, is a natural initial candidate distribution for such random discrete and, typically, sporadic events.” At the same time if a Poisson assumption is made about the underlying random variability, it will have a restricting effect of always equating the variance to the mean. In our experience with accident data this assumption is not always true. Similar findings are reported by Dean and Lawless⁶. In many cases accident data exhibit extra variation or over-dispersion relative to the Poisson model. In other words, the variance of the data is often greater than the mean. In this study all of the datasets exhibited over-dispersion characteristics relative to the Poisson model.

Model Fitting and Goodness of Fit

The model parameters were estimated by the maximum-likelihood method using Generalized Linear Modeling (GLM) methodology by maximizing log-likelihood function. Maximizing log-likelihood function has computational advantages over maximizing ordinary likelihood function L , which represent the product of the individual probability density functions of Poisson or Negative Binomial distributions. All of the datasets exhibited over-dispersion and as a result final regression parameters for Montana SPFs were estimated by maximizing log-likelihood function of the Negative Binomial distribution.

Where,

μ - Estimated number of accidents on a roadway segment over a period of a year

l - Segment Length

y_i - Observed number of accidents on roadway segment over a period of a year

$L(\mu_p)$ - Poisson likelihood function

$L(\mu, \alpha)$ - Negative Binomial likelihood function

β - Estimated regression parameters

$\gamma=0.2$ For all SPF models reflecting the fact that regression analysis was performed with 5 years of crash data.

$$\mu = l \gamma \left(\beta_{Min} + \frac{\beta_{max}(X^{\beta_0})}{X^{\beta_0} + \beta_1^{\beta_0}} \right)$$

⁶ Dean, C. & Lawless, J.F. Tests for Detecting Overdispersion in Poisson Regression Models. *Journal of the American Statistical Association* 84(406): 467-472; June 1989.

$$\mu \in \text{Poisson} \therefore \text{Var}(y) = \mu \therefore \sigma = \sqrt{\mu}$$

$$P(x = y_i) = \frac{\mu_i^{y_i}}{y_i!} e^{-\mu_i} \therefore L(\mu_p) = \prod_{i=1}^n \left(\frac{\mu_i^{y_i} e^{-\mu_i}}{y_i!} \right)$$

$$\text{Ln}(L) = \sum_{i=1}^n (y_i \ln \mu_i - \mu_i - \ln y_i!)$$

Where, α - Over-dispersion parameter also estimated by maximizing Negative Binomial log-likelihood function.

$$\mu \in \text{Negative - Binomial} \therefore \text{Var.} > \mu$$

$$\text{Var.}(y) = \mu(1 + \alpha\mu) = \mu + \alpha\mu^2 \therefore \sigma = \sqrt{\mu + \alpha\mu^2}$$

$$L(\alpha, \mu) = \prod_{i=1}^n \frac{\Gamma(\alpha^{-1} + y_i)}{\Gamma(\alpha^{-1}) y_i!} \left(\frac{\alpha\mu_i}{1 + \mu_i} \right)^{y_i} \left(\frac{1}{1 + \alpha\mu_i} \right)^{\alpha^{-1}}$$

$$\text{Ln}(L(\alpha, \mu)) = \sum_{i=1}^n \left[\ln \left(\frac{\Gamma(\alpha^{-1} + y_i)}{\Gamma(\alpha^{-1}) y_i!} \right) + y_i \ln \left(\frac{\alpha\mu_i}{1 + \alpha\mu_i} \right) + \alpha^{-1} \ln \left(\frac{1}{1 + \alpha\mu_i} \right) \right]$$

The quality of fit was examined with the Cumulative Residuals (CURE) method described in Hauer and Bamfo⁷. This method consists of plotting the cumulative residuals for each independent variable. The goal is to graphically observe how well the function fits the data-set. To generate a CURE plot, sites are sorted by their average AADT. Then, for each site, the residual (= predicted accidents-observed accidents) is computed. Then for each site the cumulative residuals are determined and plotted for each value of the independent variable. Because of the random nature of accident counts, the cumulative residual line represents a so called 'random walk'. For a model that fits well in all ranges of, the cumulative residual plot should oscillate around zero. If the cumulative residual value steadily increases within a range of values of the independent variable, this means that within that range the model predicts fewer accidents than have been observed. Conversely, a decreasing cumulative residual line indicates that in that range fewer accidents have been observed than are predicted by the model. A frequent departure of the cumulative residual line beyond two standard deviations of a random walk indicates a presence of outliers or signifies an ill-fitting model. For instance, Figure 3 shows a CURE plot reflecting a model fit relating injury and fatal crashes and AADT for the Montana 2-Lane Rural Highways in the mountainous terrain. Because the CURE residual line lies well within the two standard deviation and generally oscillates around zero, it can be concluded that the functional form and the model parameters fit the data well. All CURE plots (Figures 4-39) reflecting severity and frequency models of the Montana SPFs developed under this project show a very acceptable fit.

⁷ Hauer and Bamfo, Two Tools for Finding What Function Links the Dependent Variable to the Explanatory Variables. *ICTCT Conference Proceedings*. Lund, Sweden 1997.

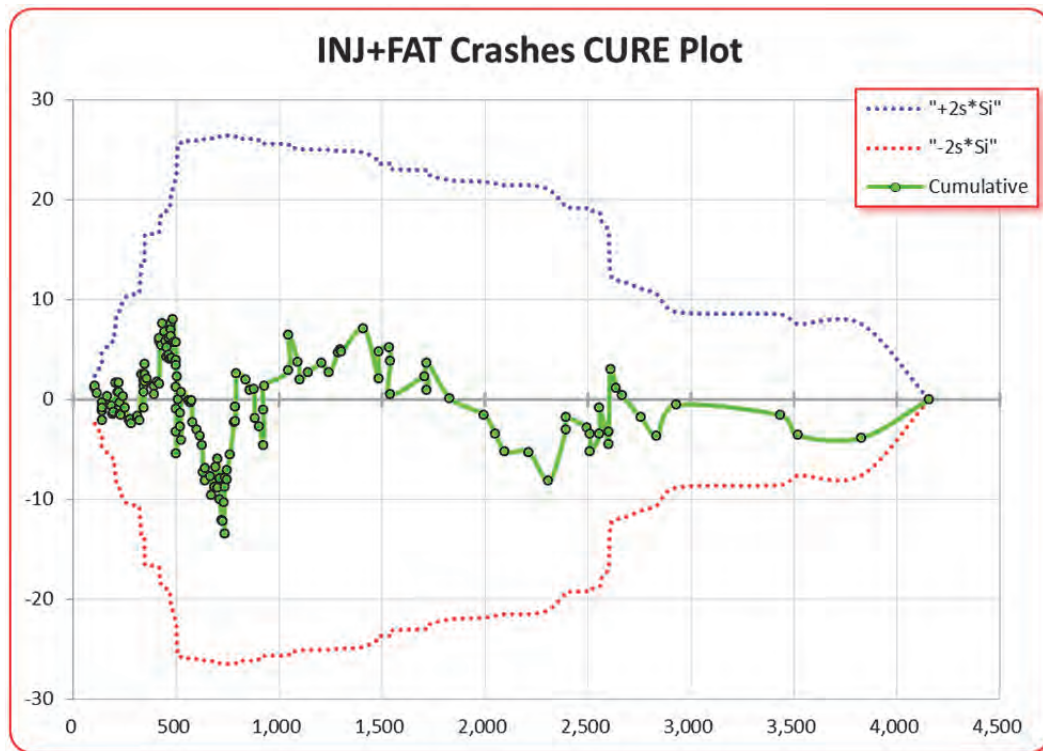


Figure 3 CURE Plot SPF - Rural Mountainous 2-Lane Highways – Inj+Fat Model

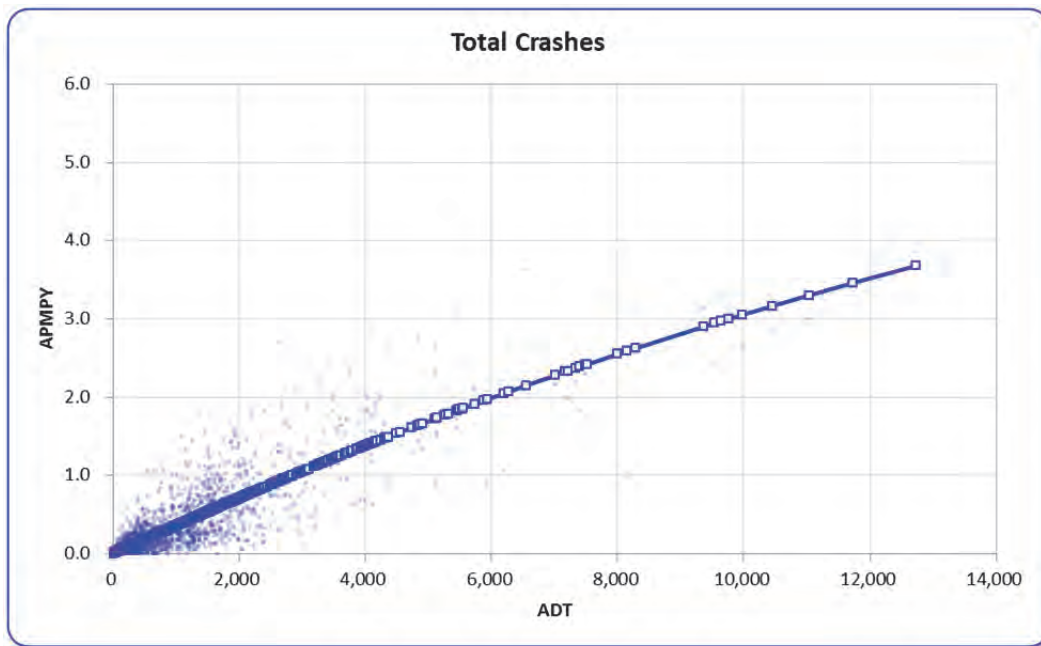


Figure 4 SPF - Rural Flat and Rolling 2-Lane Highways – Total Model

$$E(y) = L\gamma(\beta_{min} + \frac{\beta_{max}(X^{\beta_0})}{X^{\beta_0} + \beta_1^{\beta_0}}), \beta_{min} = 0.0000, \beta_{max} = 6.2781E+01, \\ , \beta_0 = 1.0483E+00, \beta_1 = 2.9486E+04, \alpha = 1.4247$$

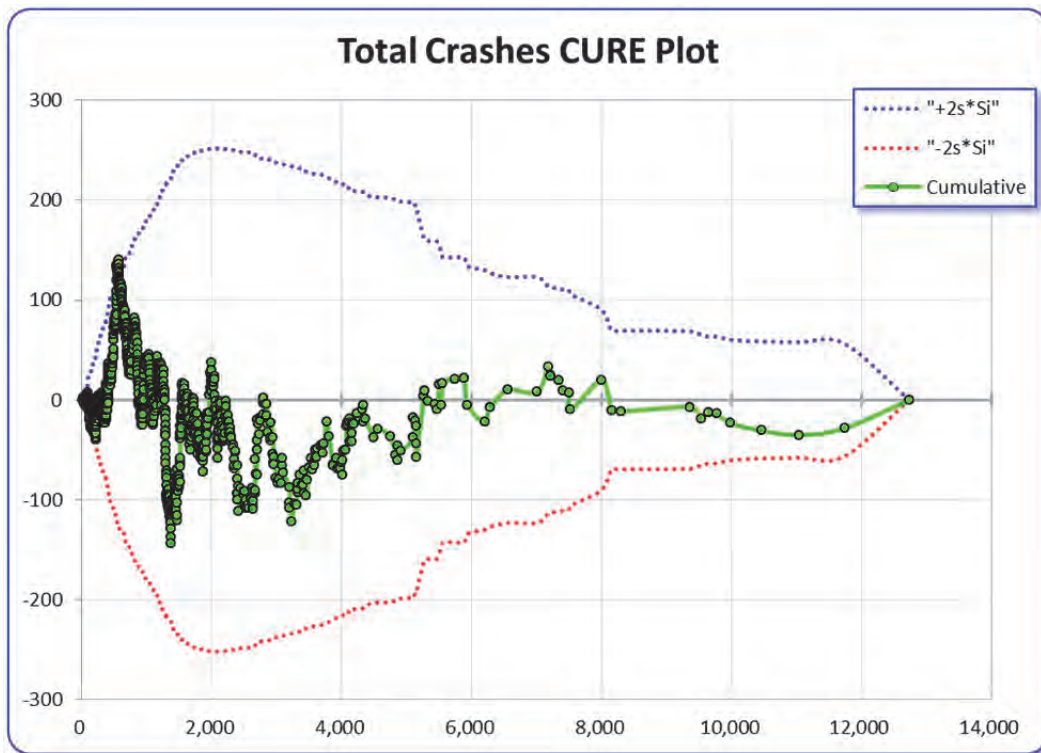


Figure 5 CURE Plot SPF - Rural Flat and Rolling 2-Lane Highways-Total Model

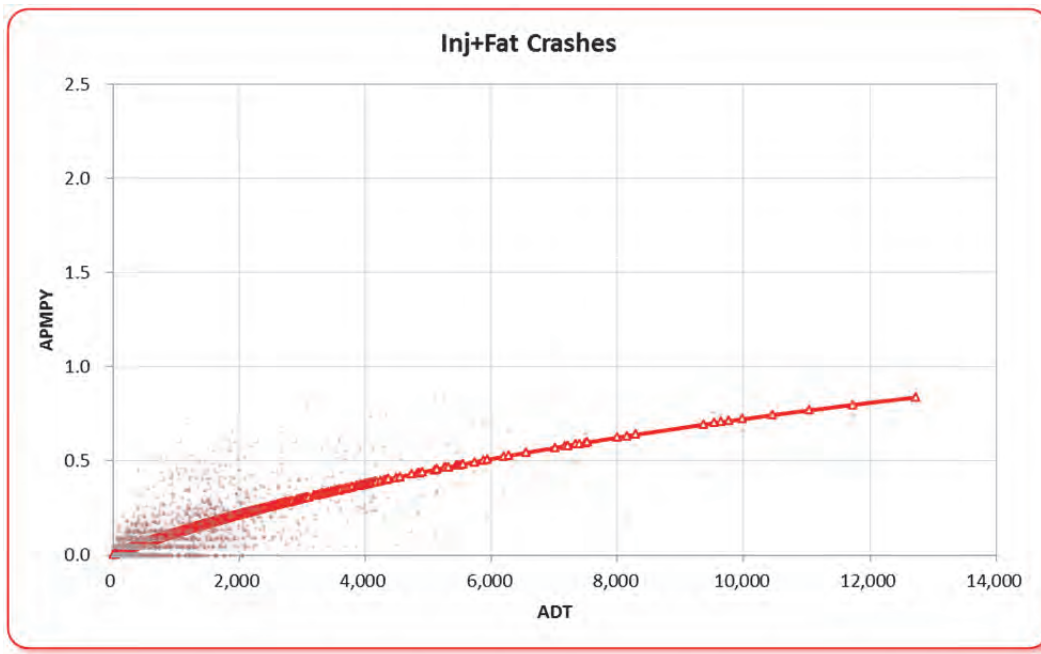


Figure 6 SPF - Rural Flat and Rolling 2-Lane Highways Inj+Fat Model

$$E(y) = L\gamma(\beta_{min} + \frac{\beta_{max}(x^{\beta_0})}{x^{\beta_0} + \beta_1^{\beta_0}}), \beta_{min} = 0.0000, \beta_{max} = 1.1434E+01$$

$$, \beta_0 = 9.2938E-01, \beta_1 = 2.2989E+04, \alpha = 1.4614$$

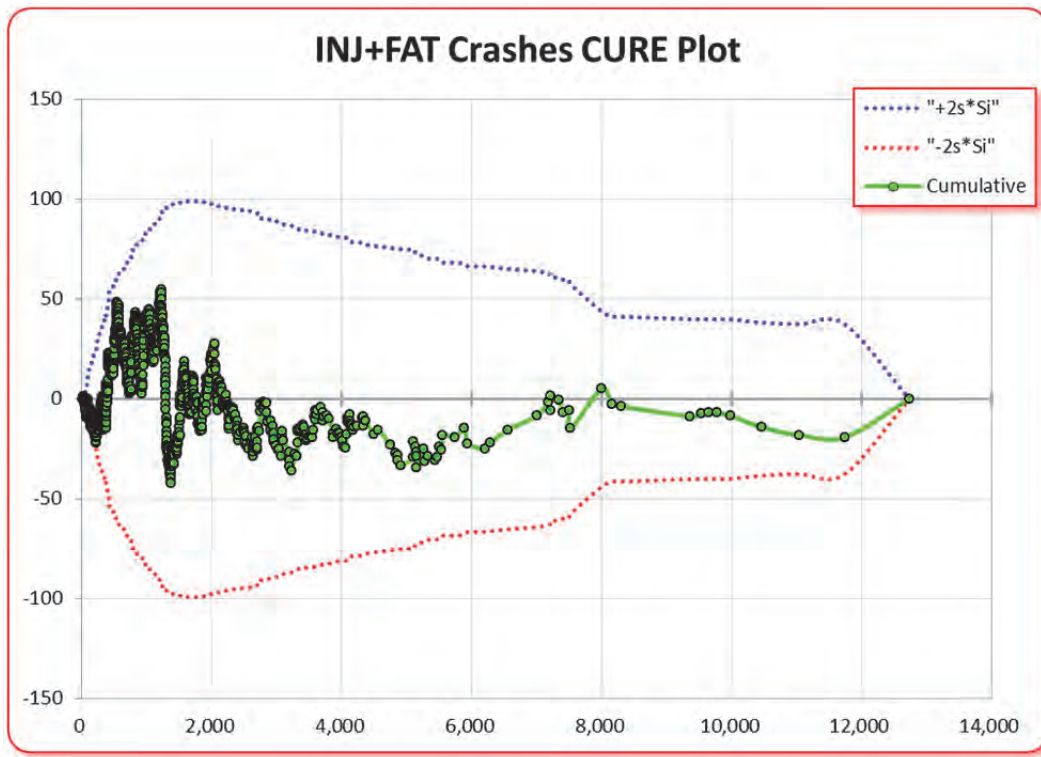


Figure 7 CURE Plot SPF - Rural Flat and Rolling 2-Lane Highways- Inj+Fat Model

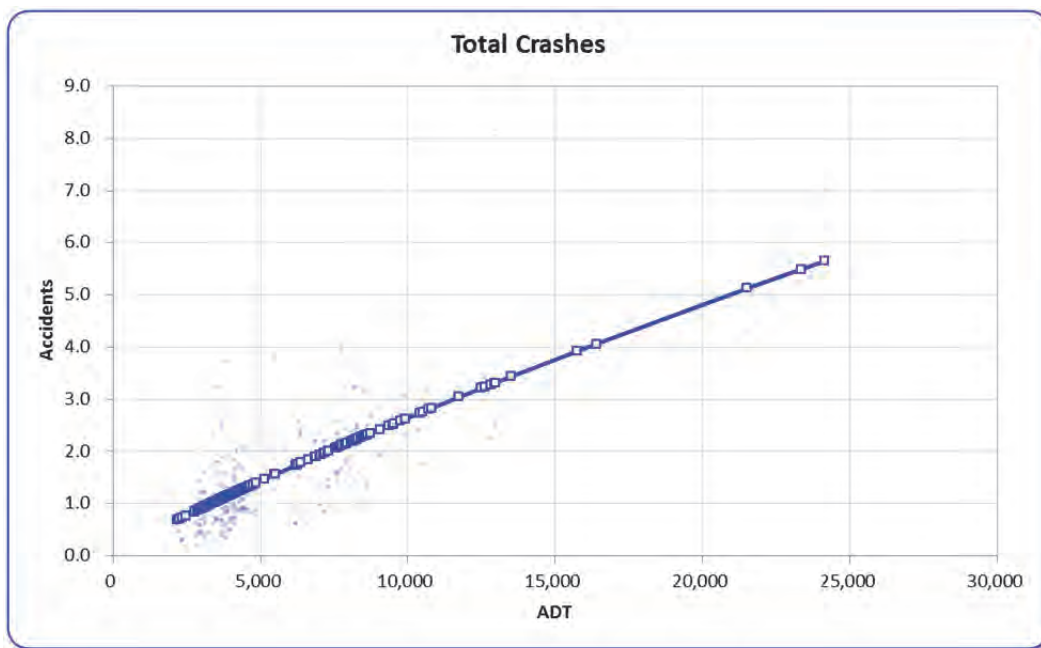


Figure 8 SPF - Rural Flat and Rolling 4-Lane Divided Freeways – Total Model

$$E(y) = L \gamma \left(\beta_{\min} + \frac{\beta_{\max} (X^{\beta_0})}{X^{\beta_0} + \beta_1^{\beta_0}} \right), \beta_{\min} = 0.0000, \beta_{\max} = 4.1791\text{E}+02, \\ \beta_0 = 9.0582\text{E}-01, \beta_1 = 4.3763\text{E}+05, \alpha = 0.8239$$

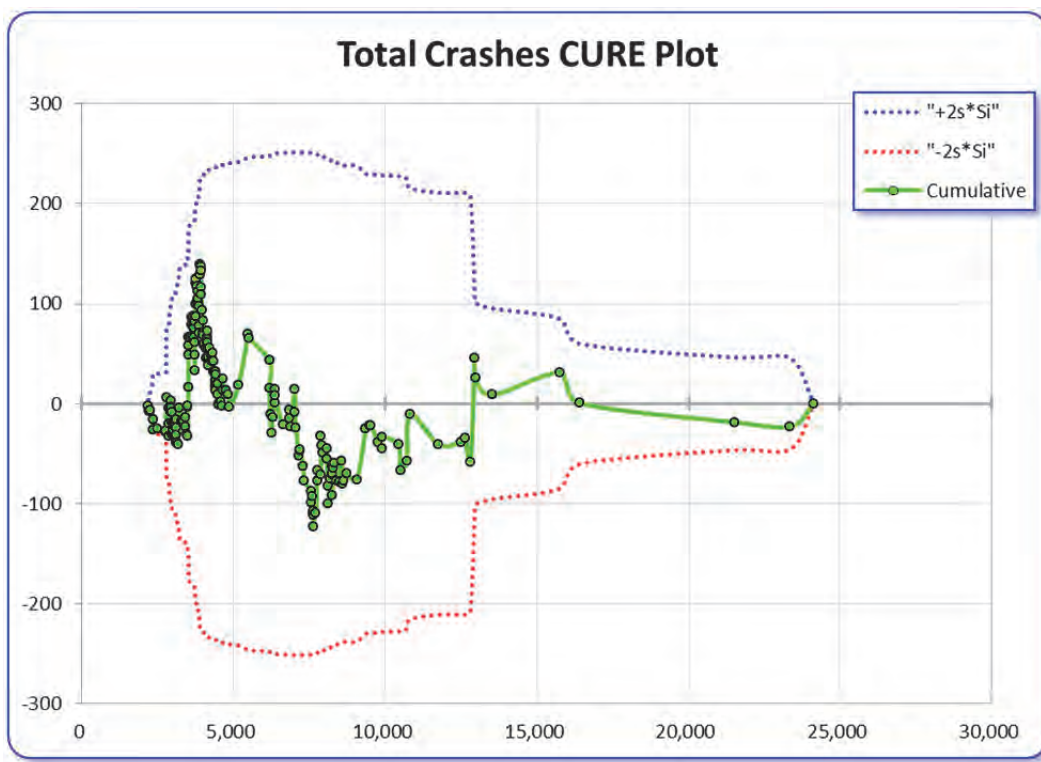


Figure 9 CURE Plot SPF - Rural Flat and Rolling 4-Lane Divided Freeways - Total Model

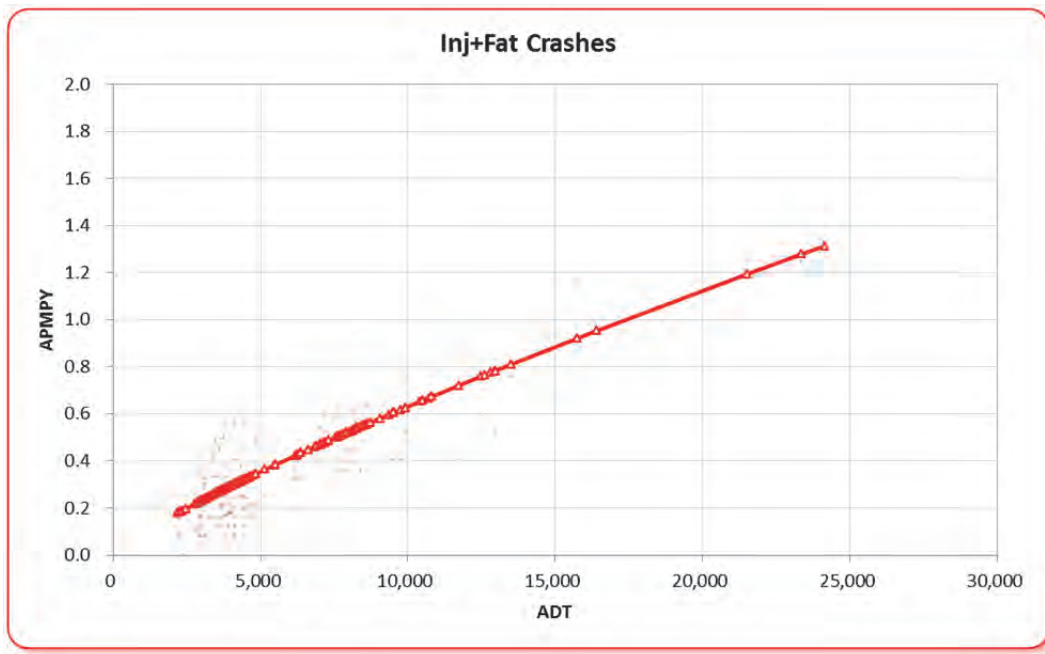


Figure 10 SPF - Rural Flat and Rolling 4-Lane Divided Freeways – Inj+Fat Model

$$E(y) = L\gamma(\beta_{min} + \frac{\beta_{max}(x^{\beta_0})}{x^{\beta_0} + \beta_1^{\beta_0}}), \beta_{min} = 0.0000, \beta_{max} = 5.7794E+03,$$

$$\beta_0 = 8.3363E-01, \beta_1 = 8.2167E+07, \alpha = 0.5597$$

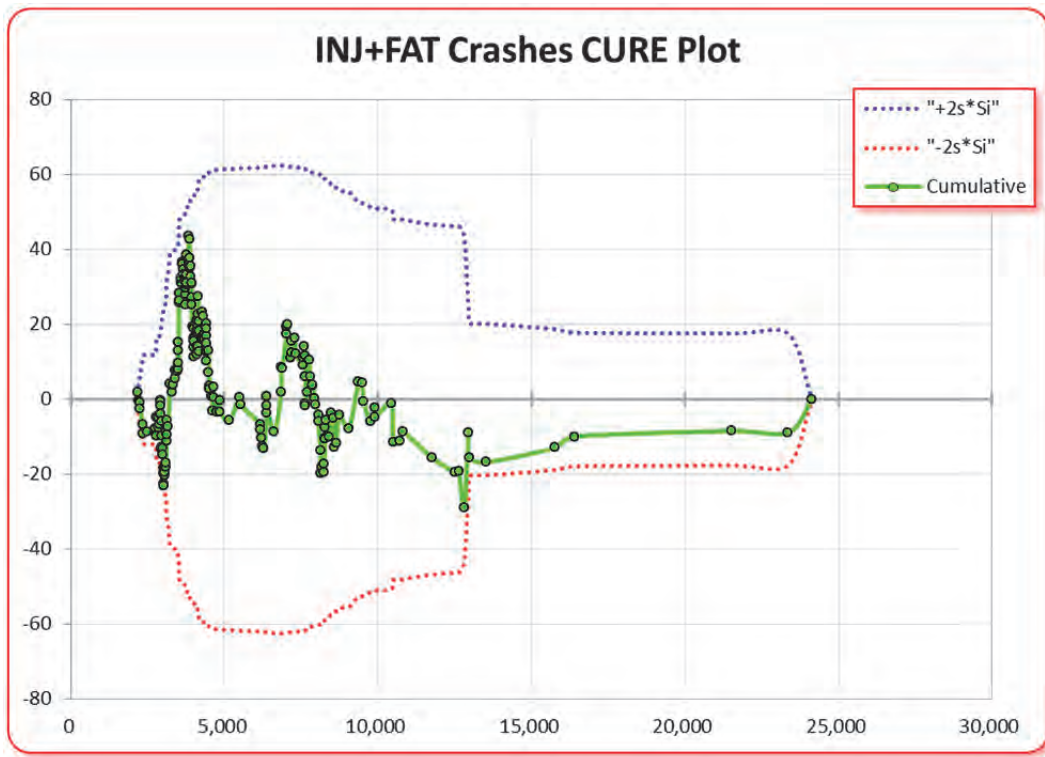


Figure 11 CURE Plot SPF - Rural Flat and Rolling 4-Lane Divided Freeways – Inj+Fat Model

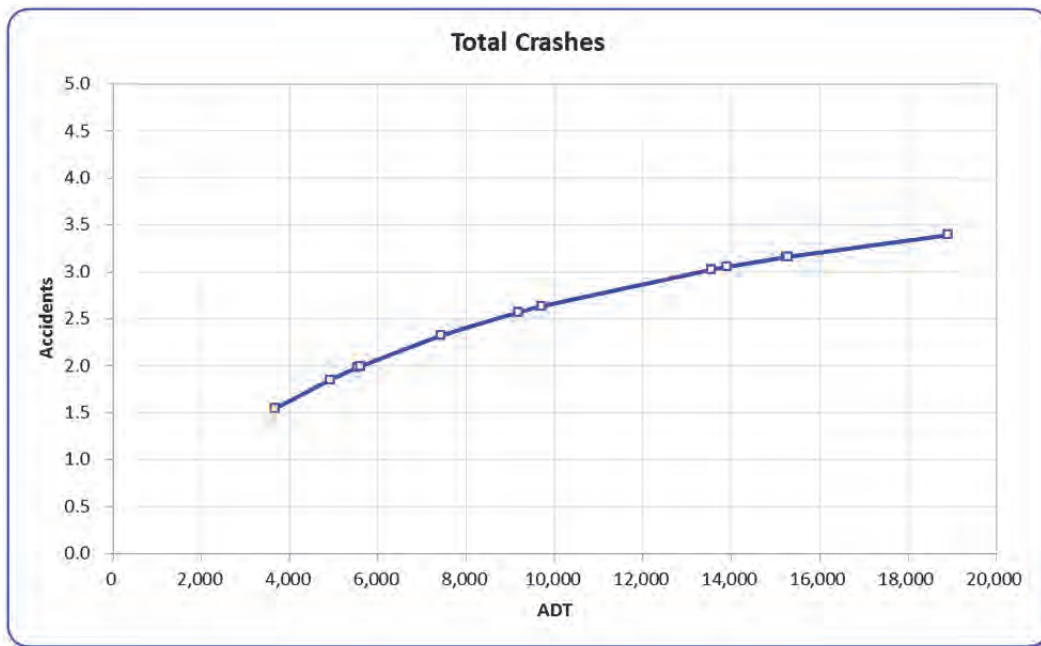


Figure 12 SPF - Rural Flat and Rolling 4-Lane Divided Highways – Total Model

$$E(y) = L\gamma\left(\beta_{min} + \frac{\beta_{max}(x^{\beta_0})}{x^{\beta_0} + \beta_1^{\beta_0}}\right), \beta_{min} = 3.1209E-02, \beta_{max} = 2.5560E+01, \\ \beta_0 = 9.2577E-01, \beta_1 = 9.1176E+03, \alpha = 0.8239$$

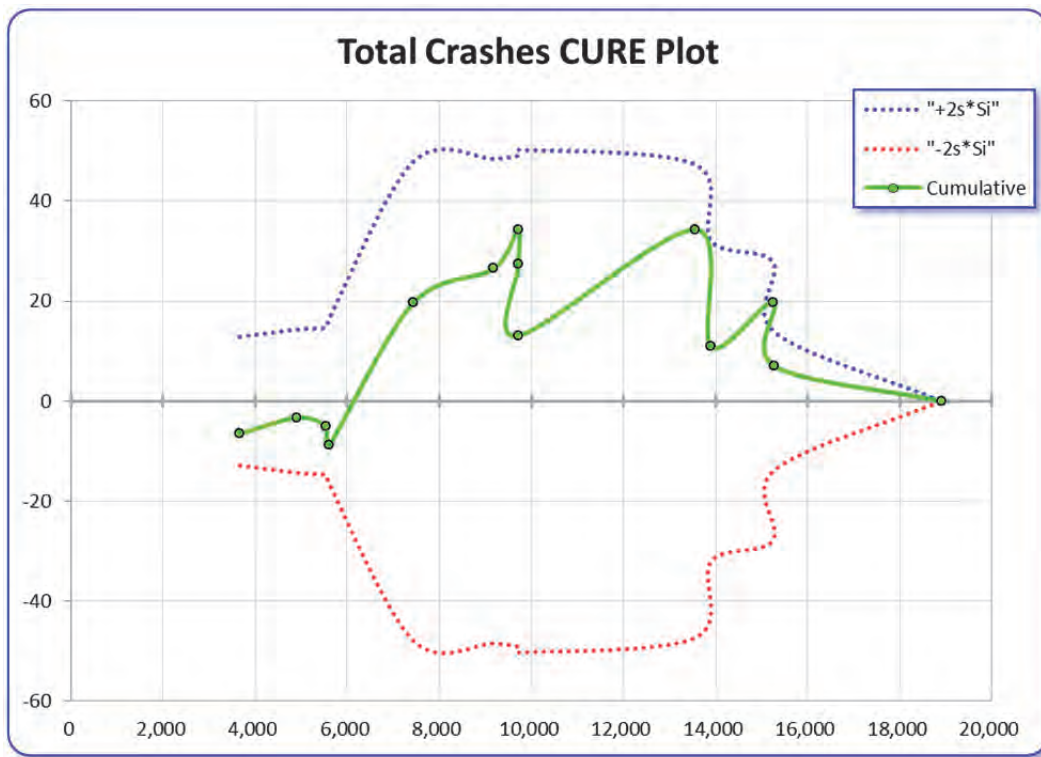


Figure 13 CURE Plot SPF - Rural Flat and Rolling 4-Lane Divided Highways - Total Model

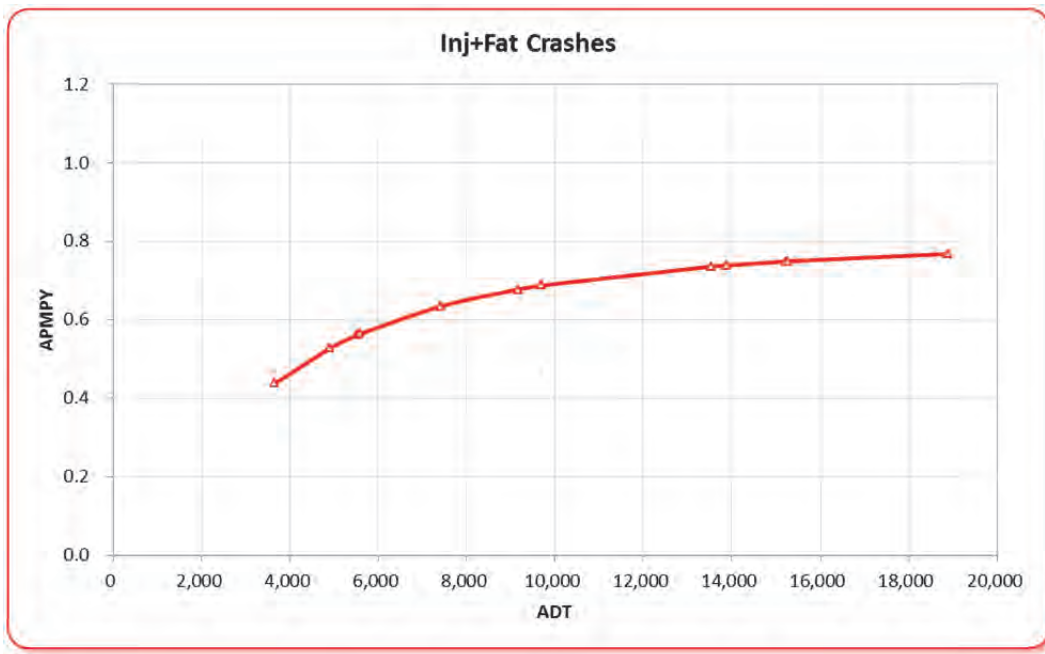


Figure 14 SPF - Rural Flat and Rolling 4-Lane Divided Highways – Inj+Fat Model

$$E(y) = L \gamma \left(\beta_{\min} + \frac{\beta_{\max}(x^{\beta_0})}{x^{\beta_0} + \beta_1^{\beta_0}} \right), \beta_{\min} = 0.0000\text{E}+00, \beta_{\max} = 4.1035\text{E}+00$$

$$\beta_0 = 1.5454\text{E}+00, \beta_1 = 3.3692\text{E}+03, \alpha = 0.0339$$

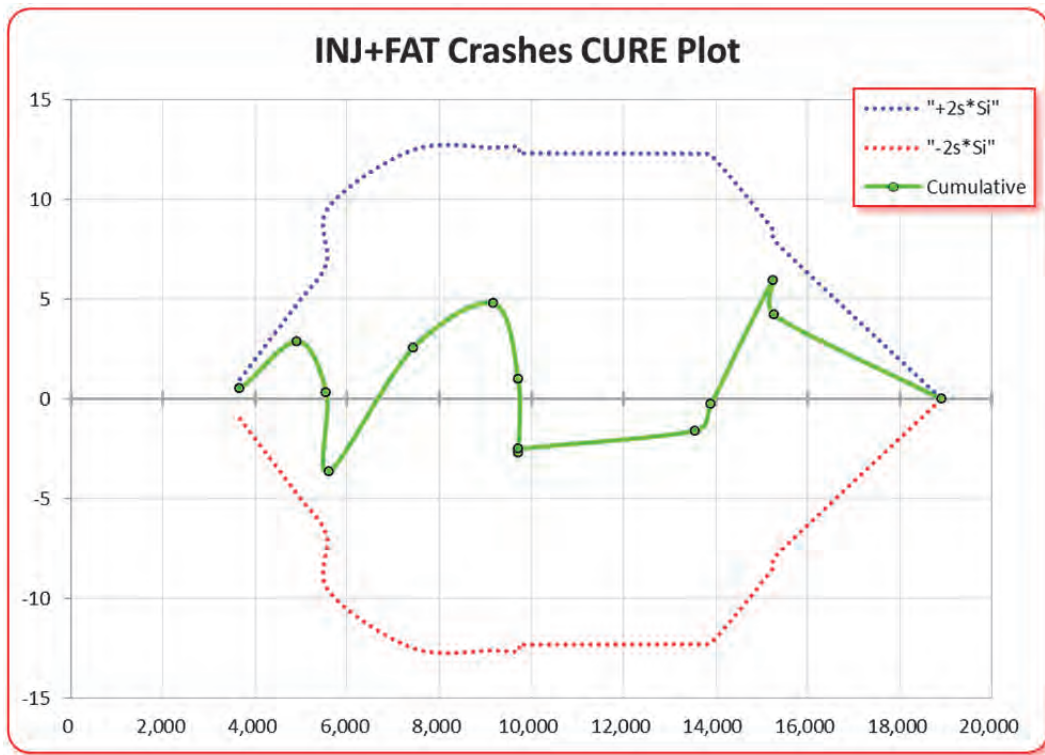


Figure 15 CURE Plot SPF - Rural Flat and Rolling 4-Lane Divided Highways – Inj+Fat Model

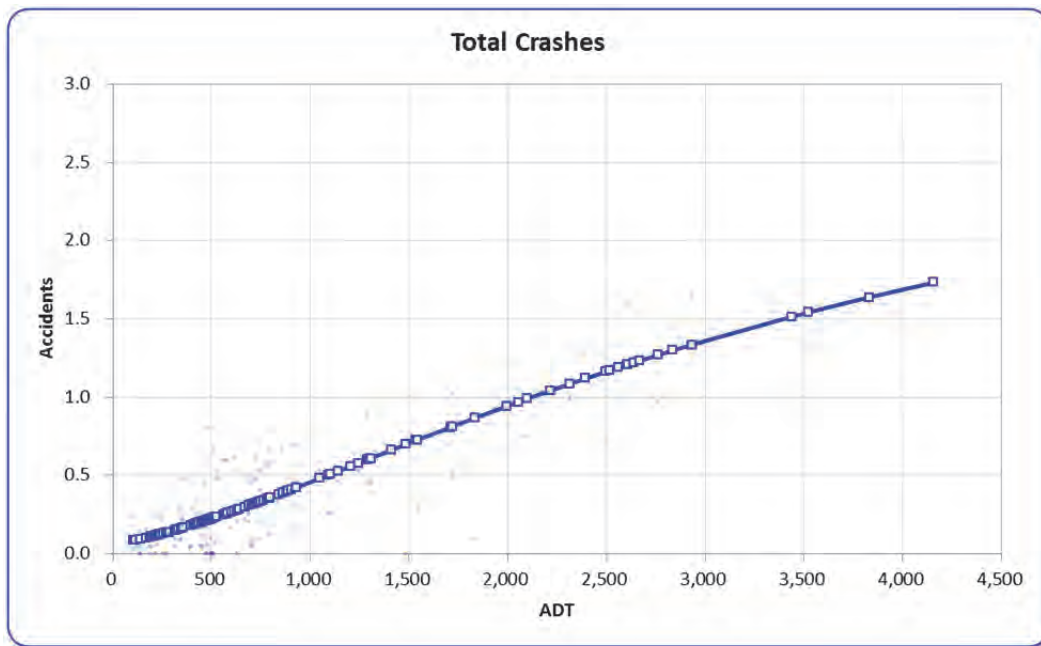


Figure 16 SPF - Rural Mountainous 2-Lane Highways – Total Model

$$E(y) = L \chi \left(\beta_{\min} + \frac{\beta_{\max}(x^{\beta_0})}{x^{\beta_0} + \beta_1^{\beta_0}} \right), \beta_{\min} = 3.4224\text{E-}01, \beta_{\max} = 1.5881\text{E+}01, \\ \beta_0 = 1.4492\text{E+}00, \beta_1 = 3.8911\text{E+}03, \alpha = 1.7235$$

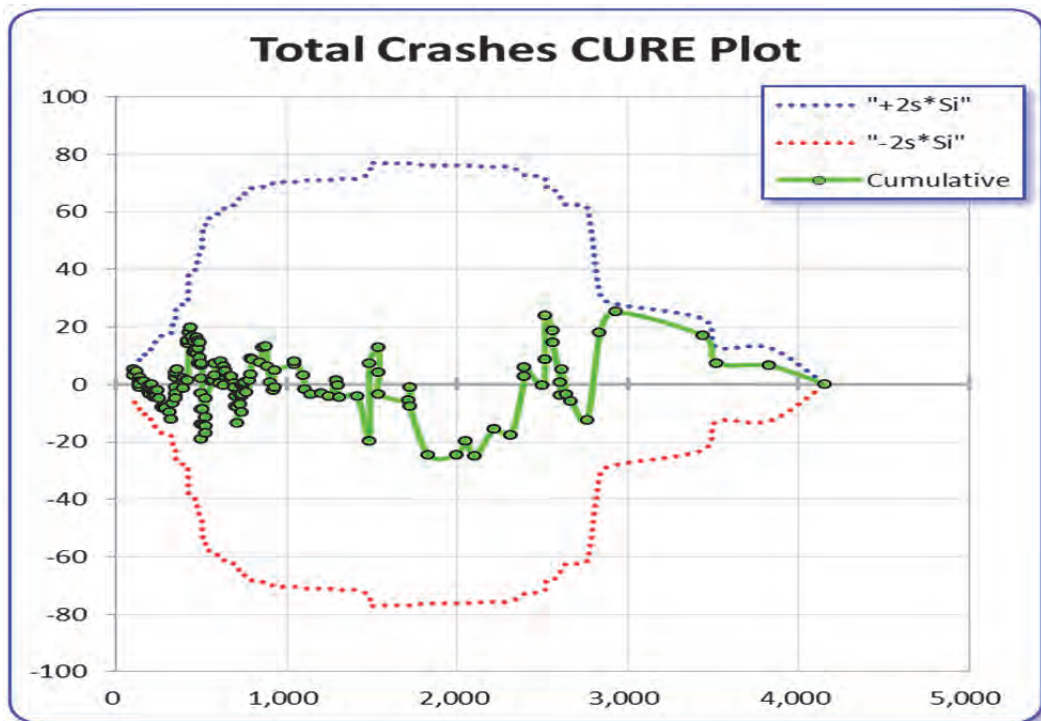


Figure 17 CURE Plot SPF - Rural Mountainous 2-Lane Highways – Total Model

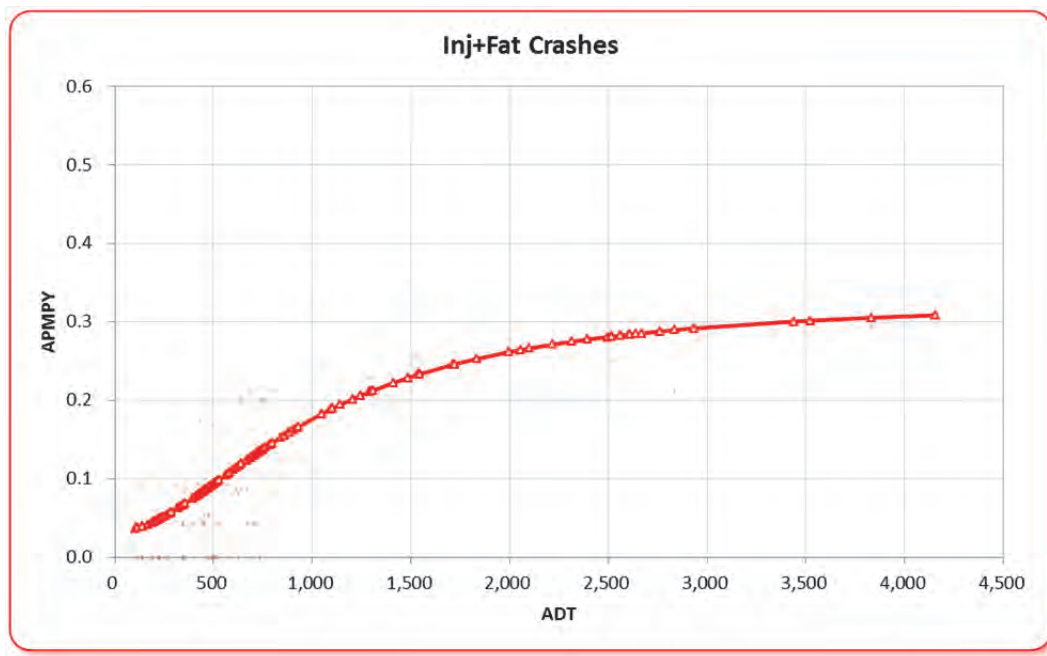


Figure 18 SPF - Rural Mountainous 2-Lane Highways – Inj+Fat Model

$$E(y) = L \gamma \left(\beta_{min} + \frac{\beta_{max}(X^{\beta_0})}{X^{\beta_0} + \beta_1^{\beta_0}} \right), \beta_{min} = 1.6045E-01, \beta_{max} = 1.4847E+00, \\ \beta_0 = 1.4492E+00, \beta_1 = 1.8505E+00, \alpha = 0.9124$$

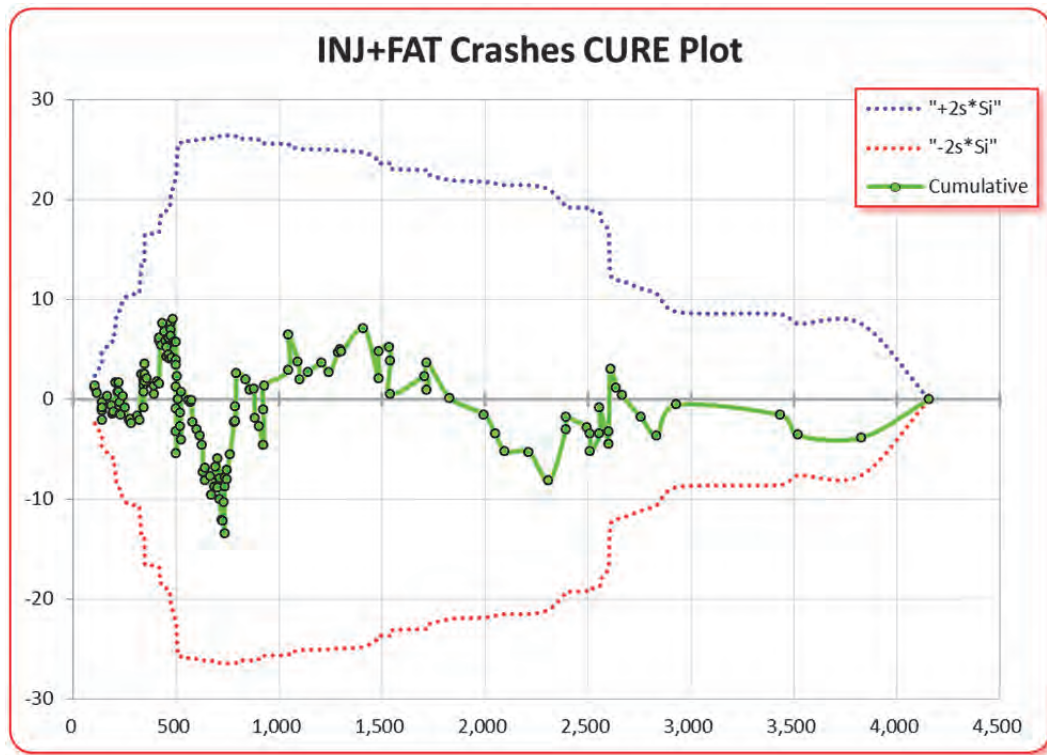


Figure 19 CURE Plot SPF - Rural Mountainous 2-Lane Highways – Inj+Fat Model

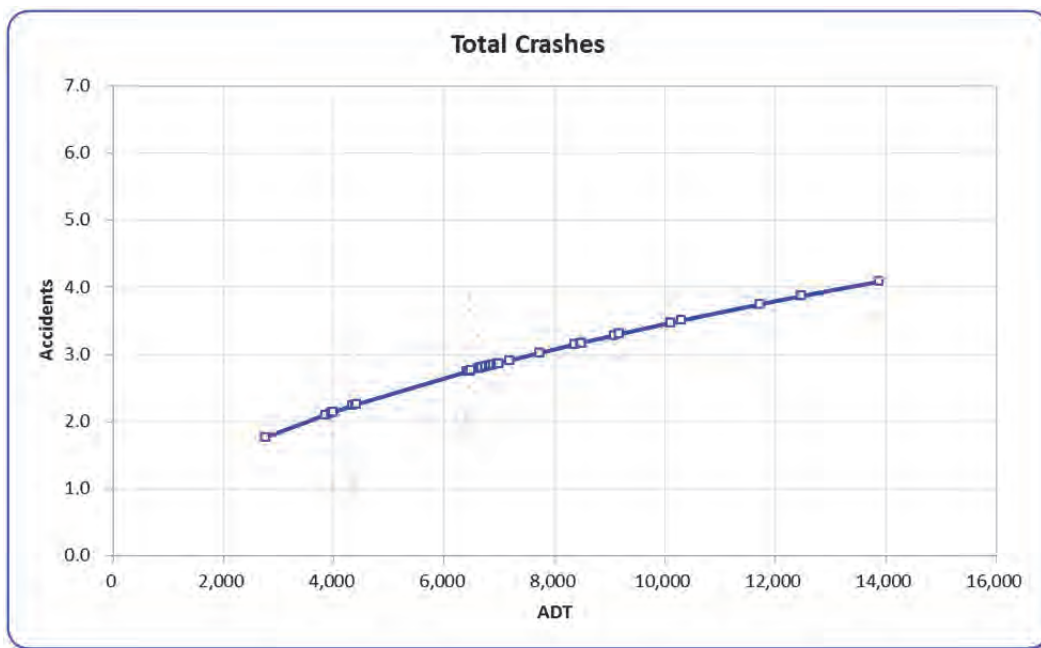


Figure 20 SPF - Rural Mountainous 4-Lane Divided Freeways – Total Model

$$E(y) = L\gamma(\beta_{min} + \frac{\beta_{max}(x^{\beta_0})}{x^{\beta_0} + \beta_1^{\beta_0}}), \beta_{min} = 3.9894E-02, \beta_{max} = 3.3808E+02$$

$$\beta_0 = 5.4506E-01, \beta_1 = 2.1372E+06, \alpha = 0.6338$$

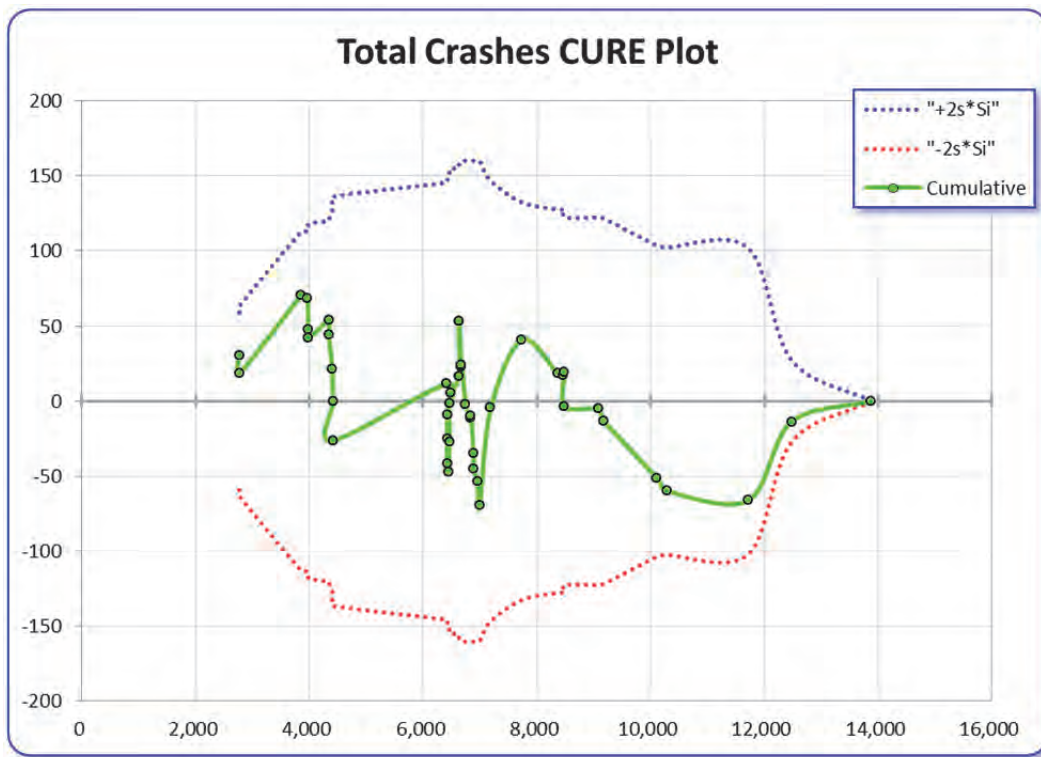


Figure 21 CURE Plot SPF - Rural Mountainous 4-Lane Divided Freeways – Total Model

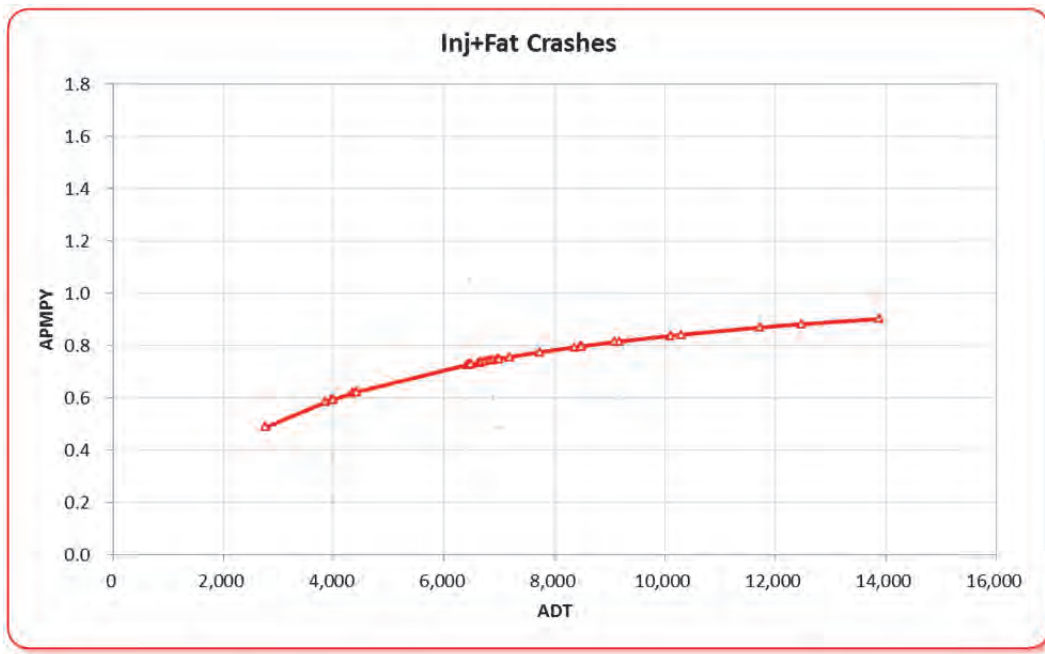


Figure 22 SPF - Rural Mountainous 4-Lane Divided Freeways – Inj+Fat Model

$$E(y) = L\gamma(\beta_{min} + \frac{\beta_{max}(X^{\beta_0})}{X^{\beta_0} + \beta_1^{\beta_0}}), \beta_{min} = 0.0000E+00, \beta_{max} = 5.6244E+00, \\ \beta_0 = 1.0324E+00, \beta_1 = 3.6078E+03, \alpha = 0.6967$$

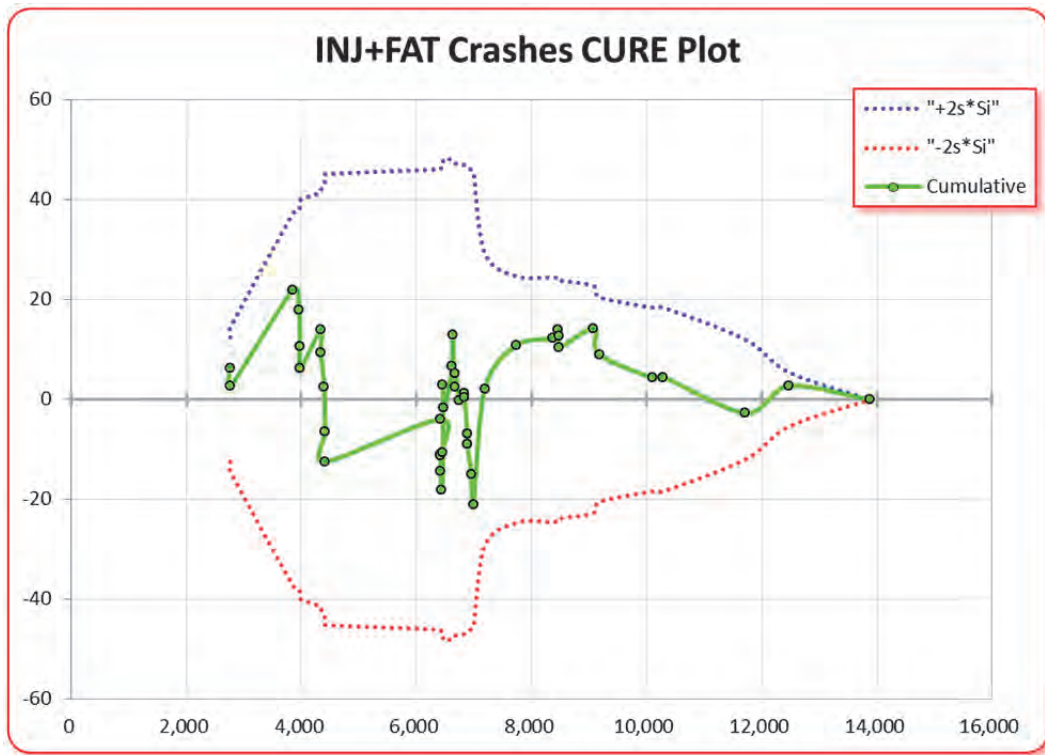


Figure 23 CURE Plot SPF - Rural Mountainous 4-Lane Divided Freeways – Inj+Fat Model

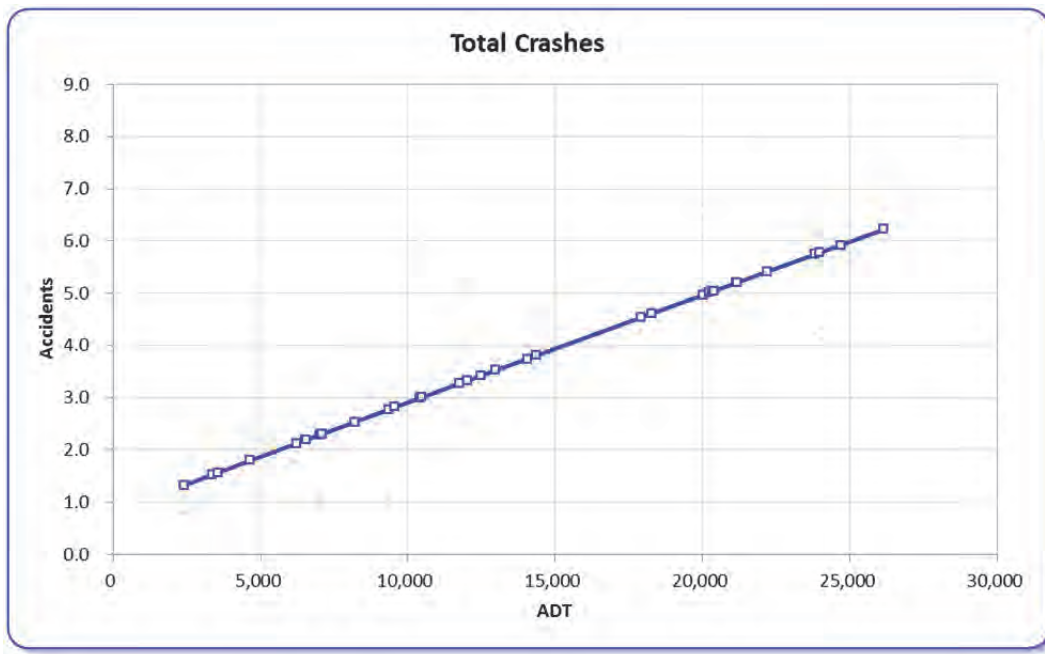


Figure 24 SPF - Urban 4-Lane Divided Freeways – Total Model

$$E(y) = L\gamma(\beta_{min} + \frac{\beta_{max}(x^{\beta_0})}{x^{\beta_0} + \beta_1^{\beta_0}}), \beta_{min} = 4.0081E+00, \beta_{max} = 4.3689E+05$$

$$\beta_0 = 9.8374E-01, \beta_1 = 4.9504E+08, \alpha = 0.2757$$

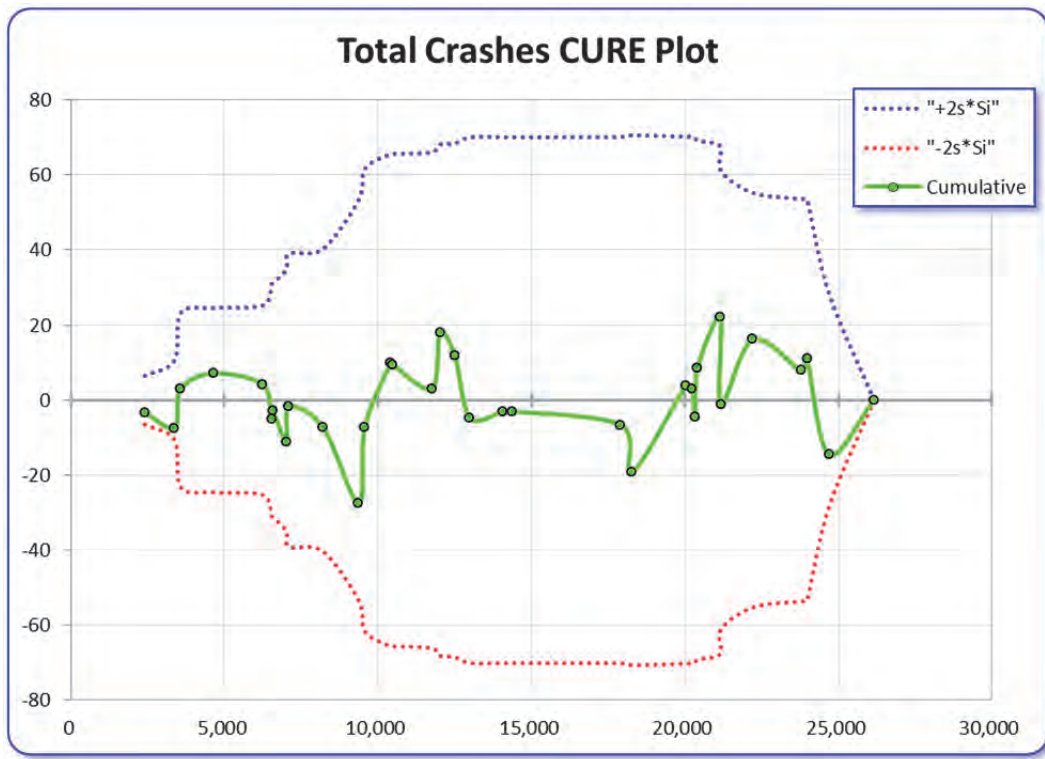


Figure 25 CURE Plot SPF - Urban 4-Lane Divided Freeways – Total Model

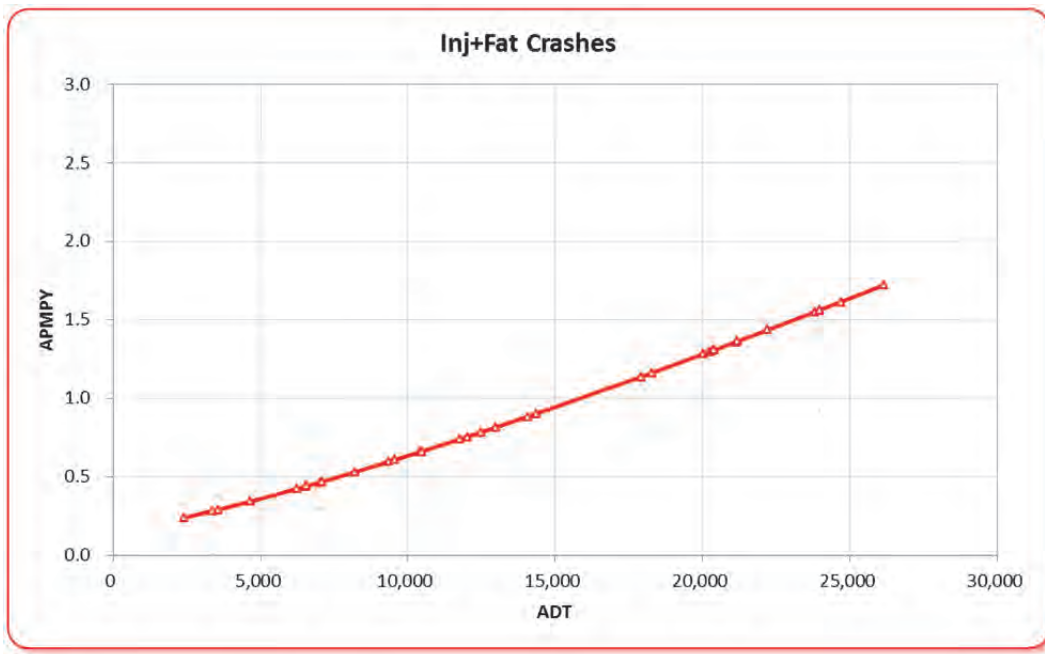


Figure 26 SPF - Urban 4-Lane Divided Freeways – Inj+Fat Model

$$E(y) = L\gamma(\beta_{min} + \frac{\beta_{max}(x^{\beta_0})}{x^{\beta_0} + \beta_1^{\beta_0}}), \beta_{min} = 7.8196E-01, \beta_{max} = 2.1199E+04, \beta_0 = 1.2380E+00, \beta_1 = 1.5518E+07, \alpha = 0.1197$$

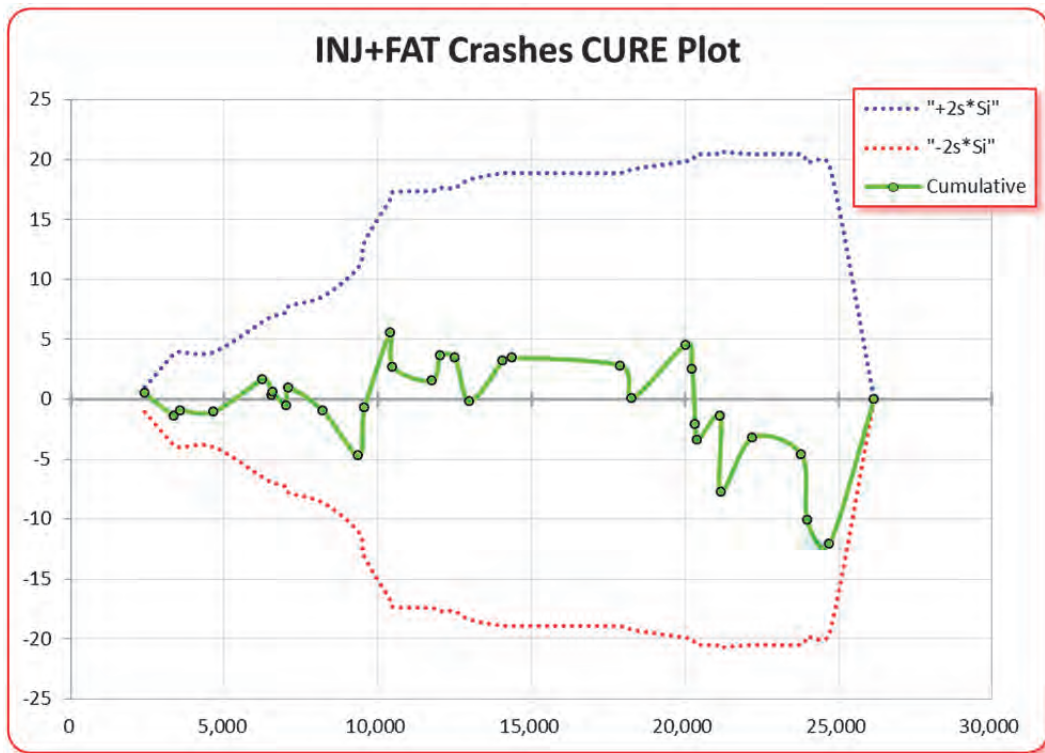


Figure 27 CURE Plot SPF - Urban 4-Lane Divided Freeways – Inj+Fat Model

Run off the Road SPFs (SPF-ROR)

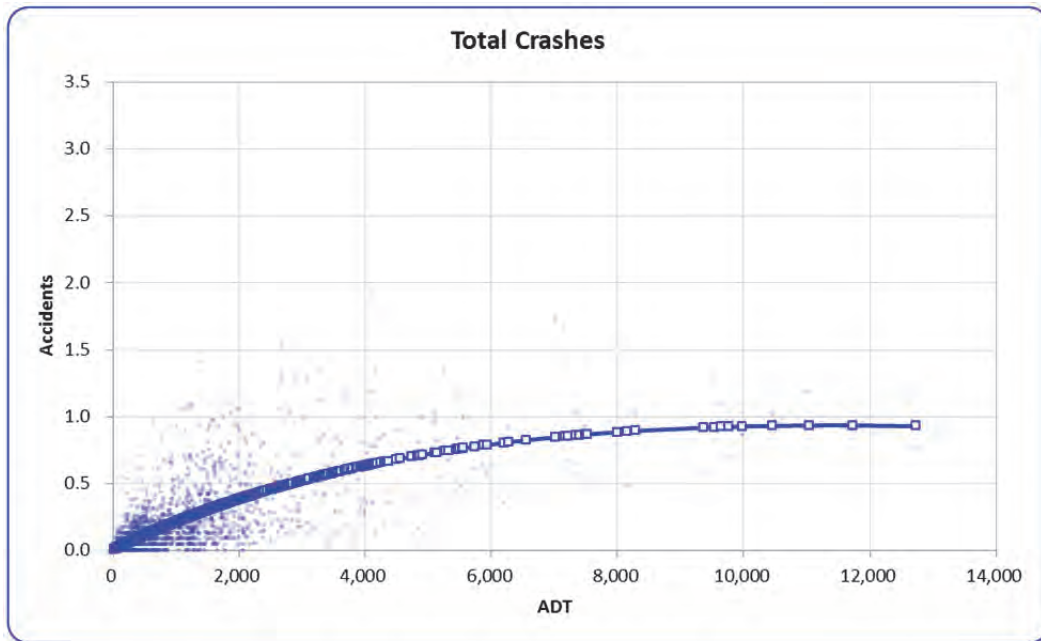


Figure 28 SPF – ROR Rural Flat and Rolling 2-Lane Highways – Total Model

$$E(y) = I\gamma\beta_0(X)^{\beta_1}e^{\beta_2 X}, \quad \beta_0 = 1.3395E-03, \quad \beta_1 = 9.7767E-01, \\ \beta_2 = -8.5616E-05, \quad \alpha = 2.0120$$

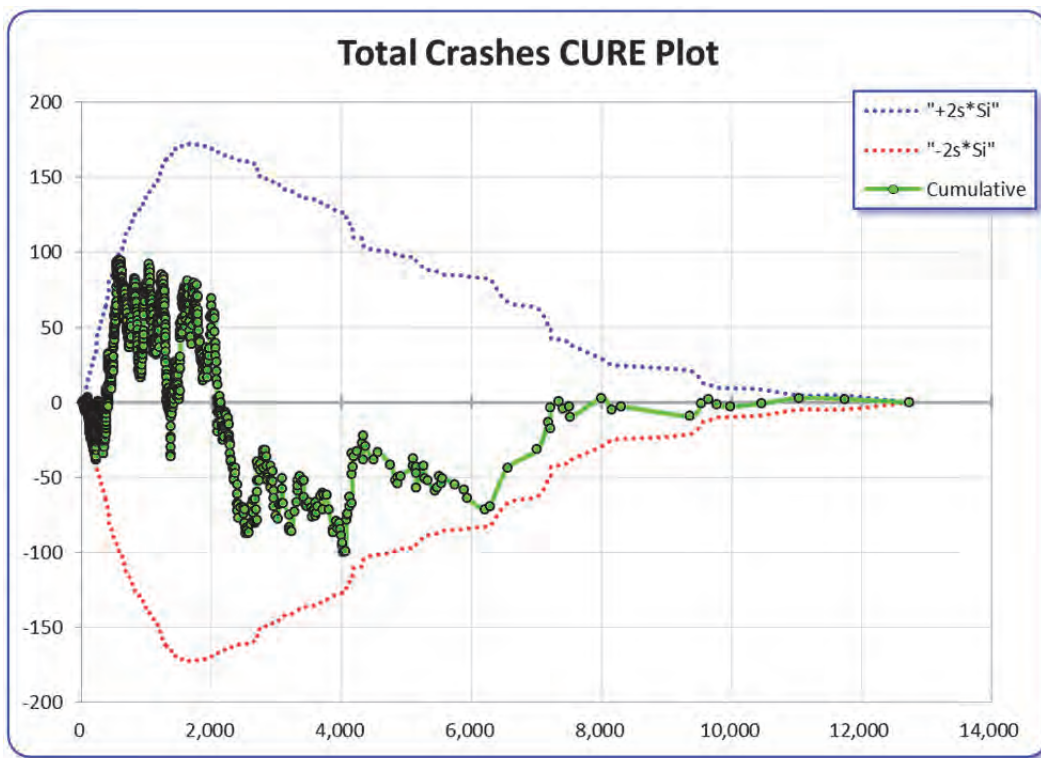


Figure 29 Cure Plot SPF – ROR Rural Flat and Rolling 2-Lane Highways – Total Model

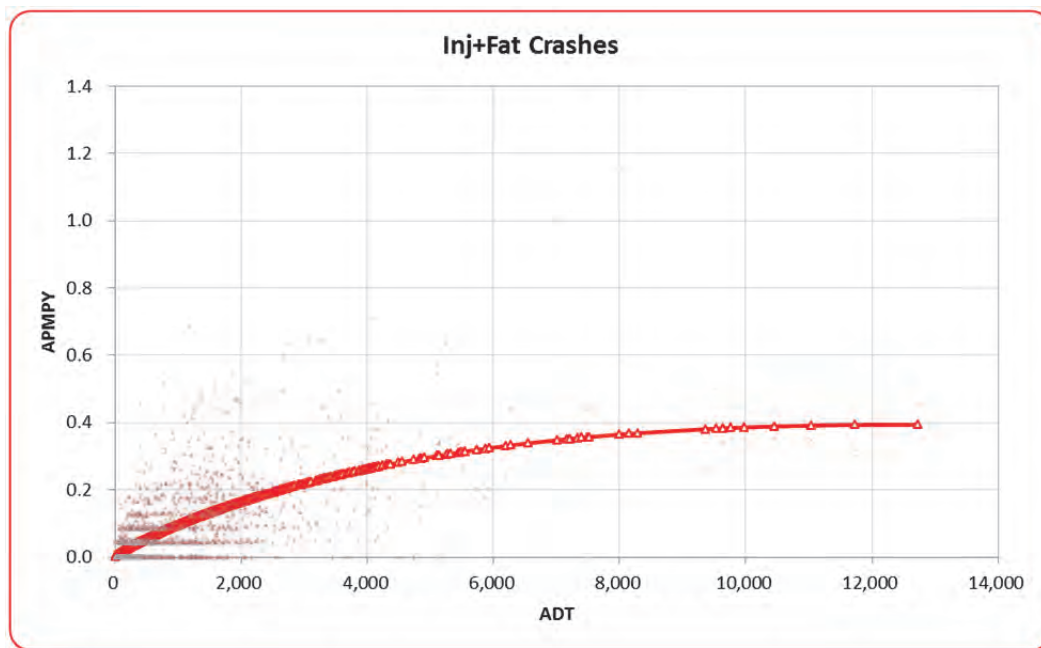


Figure 30 SPF – ROR Rural Flat and Rolling 2-Lane Highways – Inj+Fat Model

$$E(y) = I\gamma\beta_0(X)^{\beta_1}e^{\beta_2X}, \quad \beta_0 = 1.1511E-03, \beta_1 = 8.8236E-01, \\ \beta_2 = -7.0420E-05, \alpha = 1.8002$$

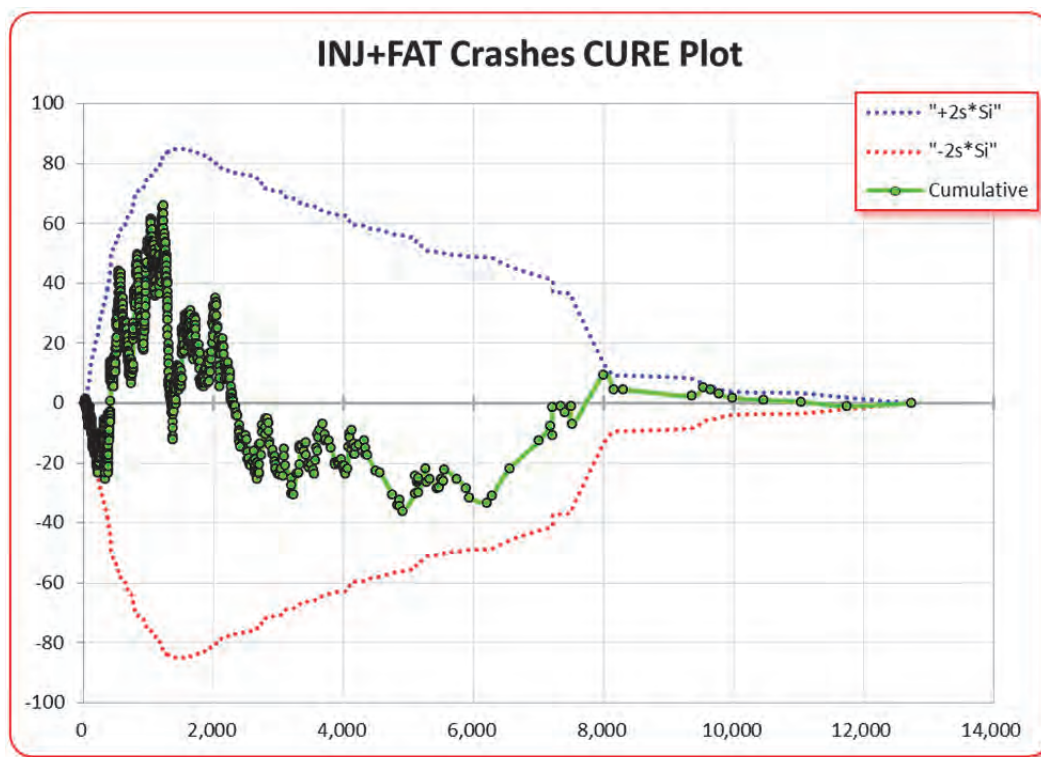


Figure 31 Cure Plot SPF – ROR Rural Flat and Rolling 2-Lane Highways – Inj+Fat Model

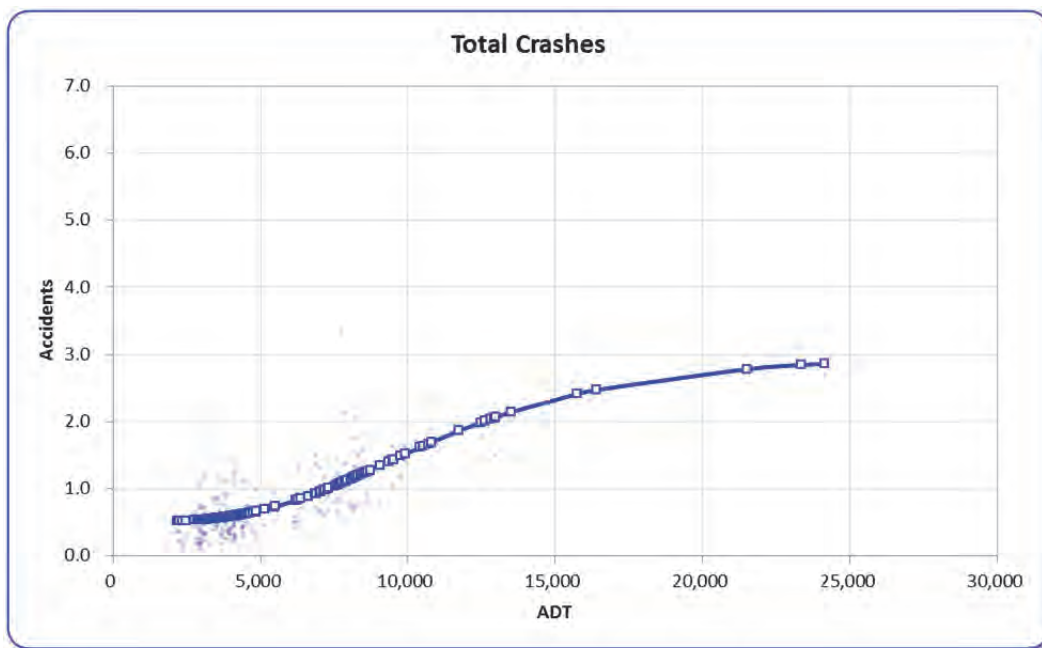


Figure 32 SPF– ROR Rural Flat and Rolling 4-Lane Divided Freeways – Total Model

$$E(y) = L\gamma(\beta_{min} + \frac{\beta_{max}(x^{\beta_0})}{x^{\beta_0} + \beta_1^{\beta_0}}), \beta_{min} = 2.5008E + 00, \beta_{max} = 1.2852E+01, \\ \beta_0 = 3.2210E+00, \beta_1 = 1.1325E+04, \alpha = 1.0712$$

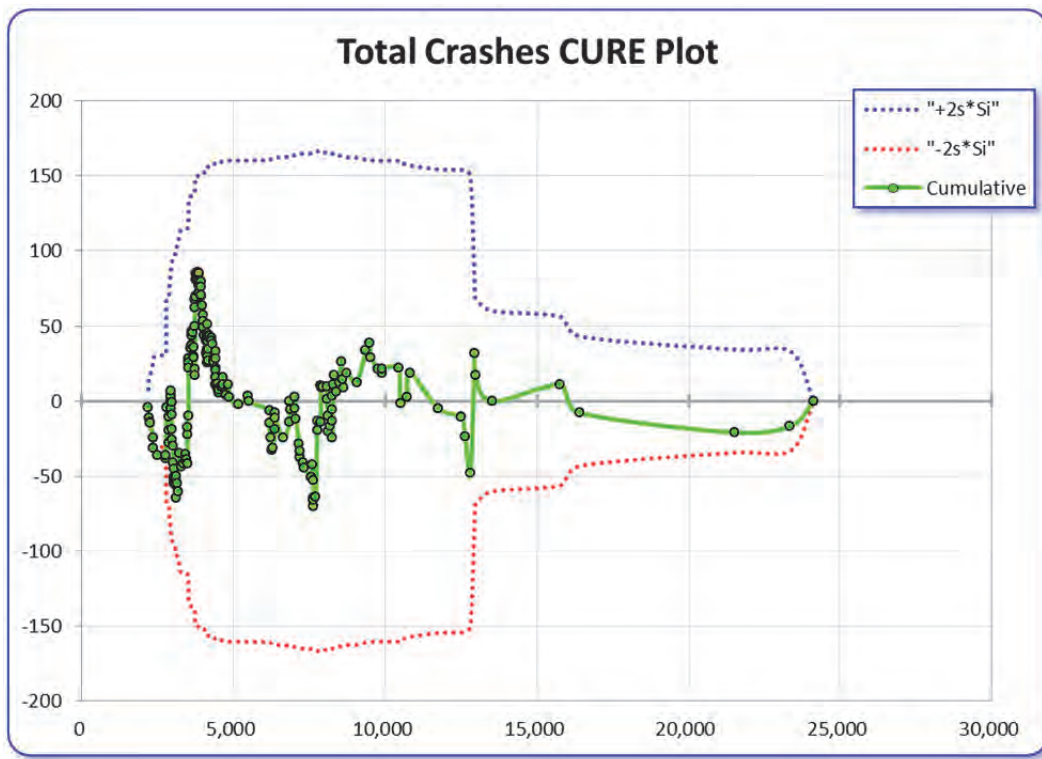


Figure 33 Cure Plot SPF-ROR Rural Flat and Rolling 4-Lane Divided Freeways – Inj+Fat Model

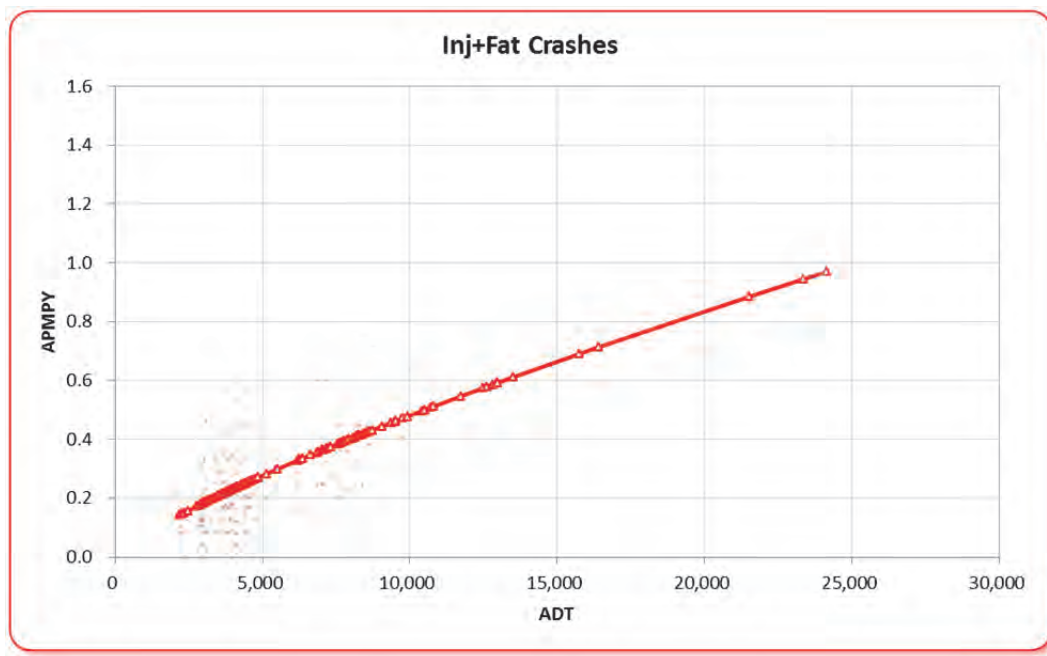


Figure 34 SPF– ROR Rural Flat and Rolling 4-Lane Divided Freeways – Inj+Fat Model

$$E(y) = L \gamma \left(\beta_{\min} + \frac{\beta_{\max}(x^{\beta_0})}{x^{\beta_0} + \beta_1^{\beta_0}} \right), \beta_{\min} = -1.3080E - 02, \beta_{\max} = 3.7423E+03, \\ \beta_0 = 7.9292E-01, \beta_1 = 1.0540E+08, \alpha = 0.6798$$

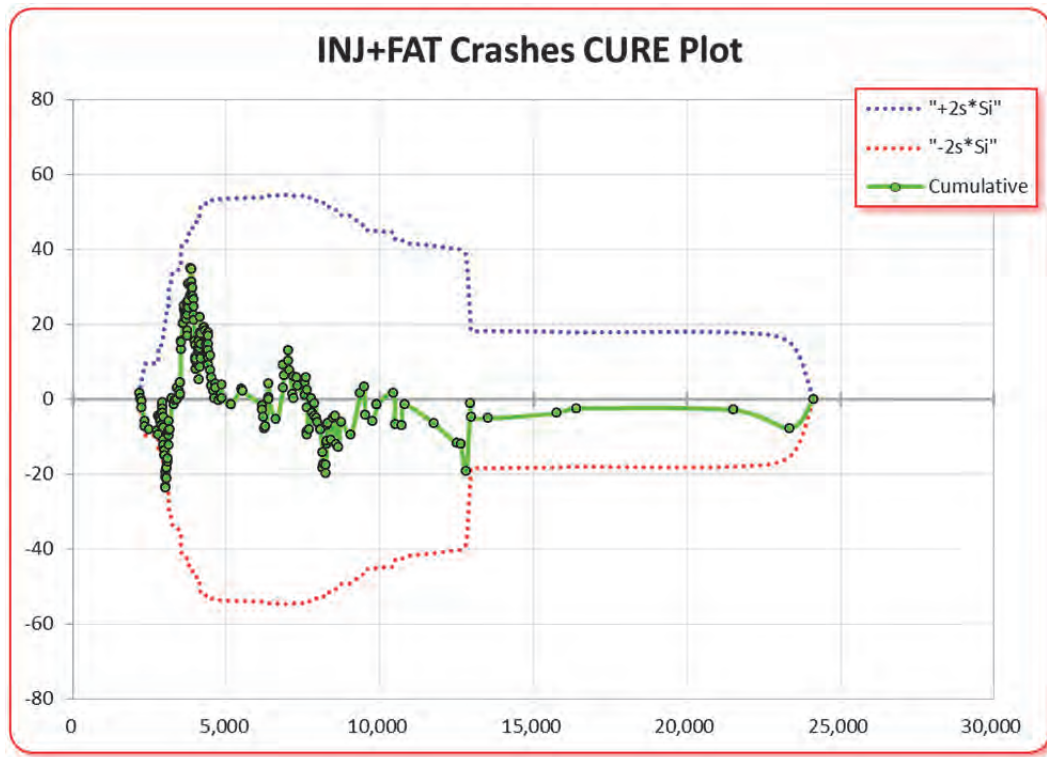


Figure 35 Cure Plot SPF– ROR Rural Flat and Rolling 4-Lane Divided Freeways – Inj+Fat Model

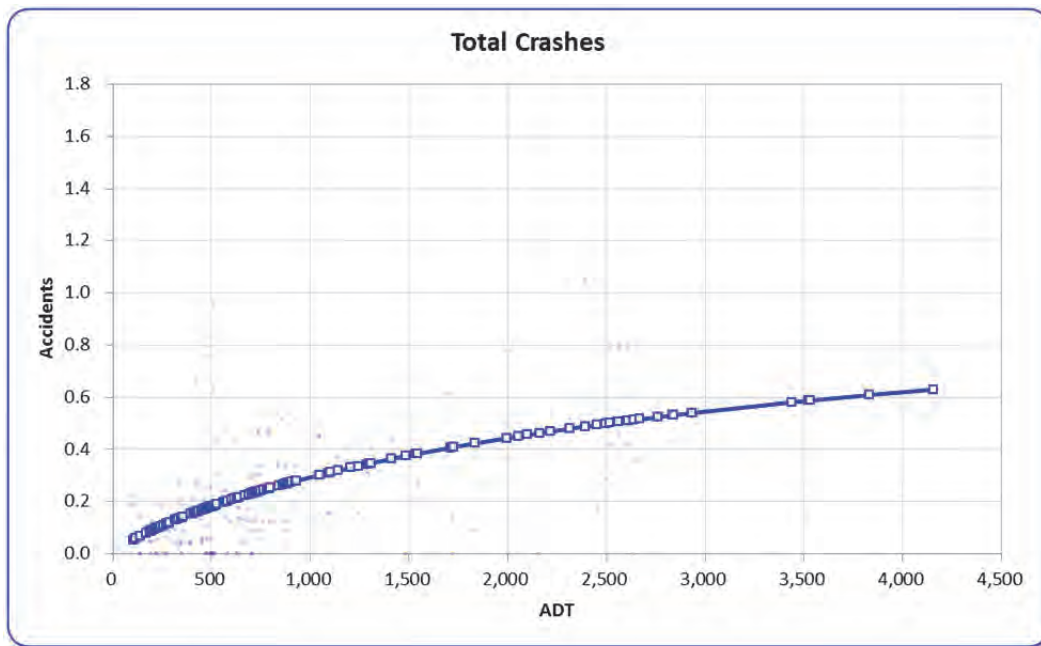


Figure 36 SPF – ROR Rural Mountainous 2-Lane Highways – Total Model

$$E(y) = L\gamma(\beta_{min} + \frac{\beta_{max}(x^{\beta_0})}{x^{\beta_0} + \beta_1^{\beta_0}}), \beta_{min} = .0.0000E+00, \beta_{max} = 6.0337E+00, \\ \beta_0 = 8.6039E-01, \beta_1 = 3.7572E+03, \alpha = 2.7526$$

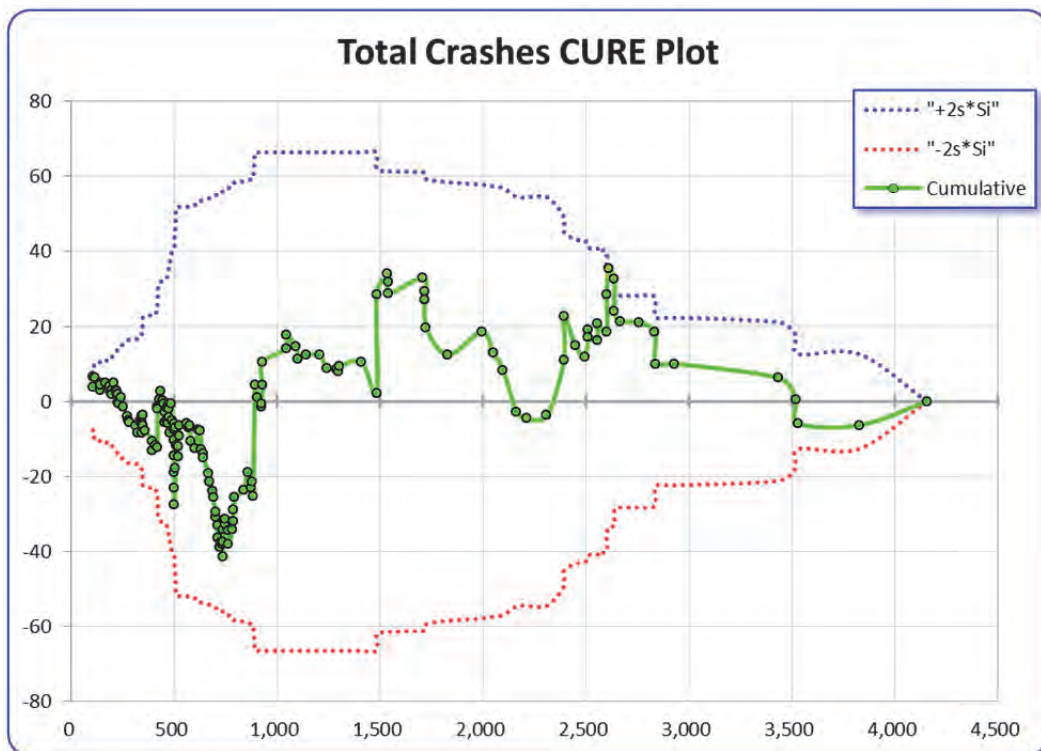


Figure 37 Cure Plot SPF – ROR Rural Mountainous 2-Lane Highways – Total Model

$$E(y) = L\gamma(\beta_{min} + \frac{\beta_{max}(x^{\beta_0})}{x^{\beta_0} + \beta_1^{\beta_0}}), \beta_{min} = .0.0000E+00, \beta_{max} = 6.0337E+00, \\ \beta_0 = 8.6039E-01, \beta_1 = 3.7572E+03, \alpha = 2.7526$$

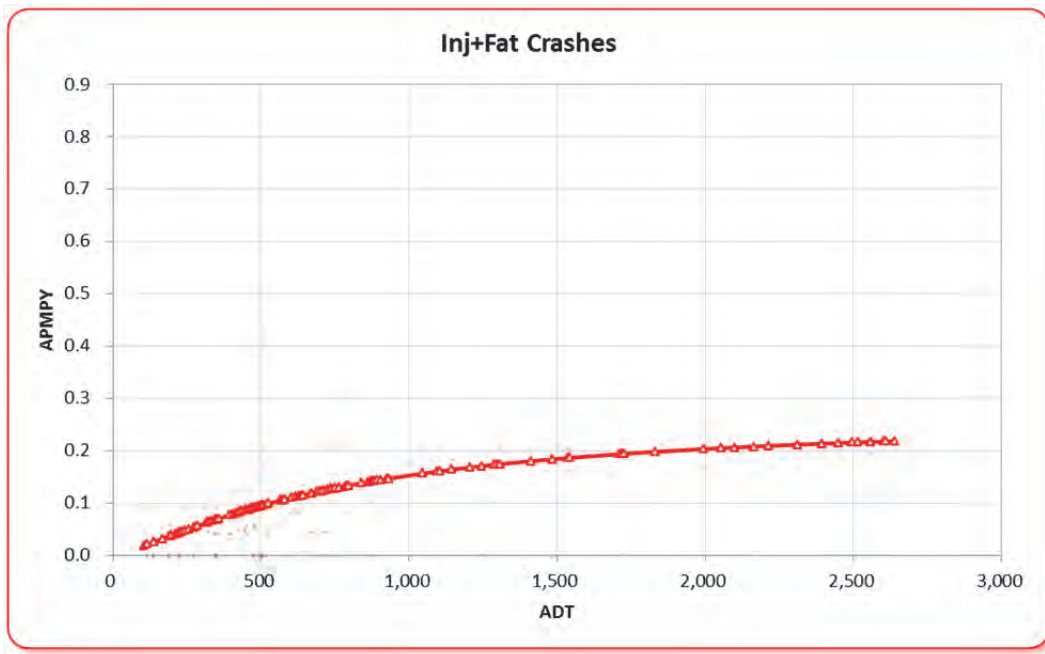


Figure 38 SPF – ROR Rural Mountainous 2-Lane Highways – Inj+Fat Model

$$E(y) = L\gamma(\beta_{min} + \frac{\beta_{max}(x^{\beta_0})}{x^{\beta_0} + \beta_1^{\beta_0}}), \beta_{min} = .0.0000E+00, \beta_{max} = 1.3093E+00, \\ \beta_0 = 1.3035E+00, \beta_1 = 7.7712E+02, \alpha = 2.4193$$

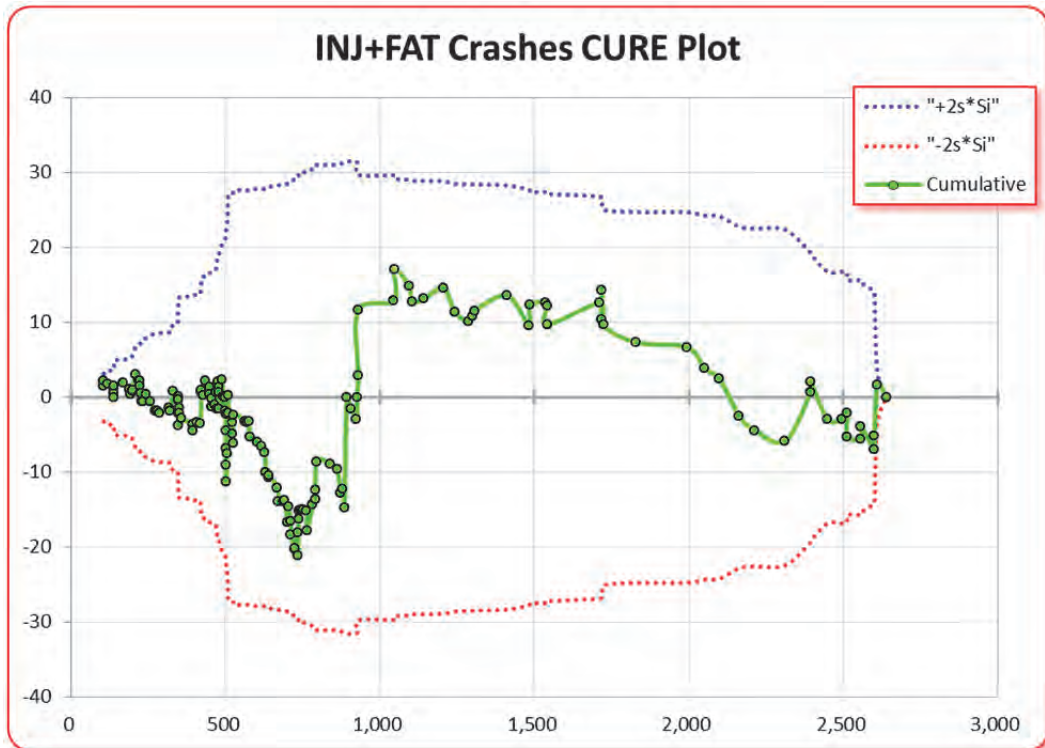


Figure 39 Cure Plot SPF – ROR Rural Mountainous 2-Lane Highways – Inj+Fat Model

CORRECTING FOR THE REGRESSION TO THE MEAN (RTM) BIAS

The best guess about the future is usually obtained by computing the average of past events. In road safety, the average of several years of crash history of a highway segment or of an intersection provides us with an estimate of what is likely to be observed in the future. The precision of this estimate, however, can be improved upon by correcting it for the Regression to the Mean (RTM) bias. RTM phenomenon reflects the tendency for random events, such as vehicle crashes to move toward the average during the course of an experiment or over time. For instance if a segment or an intersection exhibits unusually high or unusually low crash frequency in a particular year, because of RTM we need to be aware that over the long run its true average is closer to the mean representing safety performance of similar facilities. The existence of the RTM bias has been long recognized and is now effectively addressed by using the Empirical Bayes (EB) method⁸. The use of EB method is particularly effective when it takes a long time for a few accidents to occur, as is often the case on Montana rural roads.

The Empirical Bayes (EB) method for the estimation of safety increases the precision of estimation and corrects for the regression to the mean bias. It is based on combining the information contained in accident counts (known crash history) with the information contained in knowing the safety of similar entities. The information about safety of similar entities is brought into the EB procedure by the Safety Performance Function (SPF). To illustrate the application of the EB method let's examine safety performance of Montana SH 280 between MP 0.80 and MP 2.00 over a period of 5 years (1/1/2008-12/31/2012).

Observed accident frequency η is 4.83 acc/mile per year

Expected frequency μ is 1.66 acc/mile per year predicted by the SPF

EB correction parameter $\phi = 0.702$ estimated from the SPF,

Number of years of crash history $n = 5$

$$\text{Weight (W)} = \frac{1}{1 + (\mu \times n) / \phi} = \frac{1}{1 + (1.66 \times 5) / 0.702} = 0.078$$

$$\text{EB Corrected Estimate} = W \times \mu + (1-W) \times \eta =$$

$$= 0.078 \times 1.66 + (1.00-0.078) \times 4.83 = 4.58 \text{ acc/mile per year}$$

⁸ Hauer et al. Estimating Safety by the Empirical Bayes Method. In *Transportation Research Record 1174*, TRB, National Research Council, Washington, D.C., 2002, pp 126-131.

SPF representing safety performance of SH280 between MP 0.80 and MP 2.00 with and without EB correction is provided on Figure 40. In this case the magnitude of correction is relatively small.

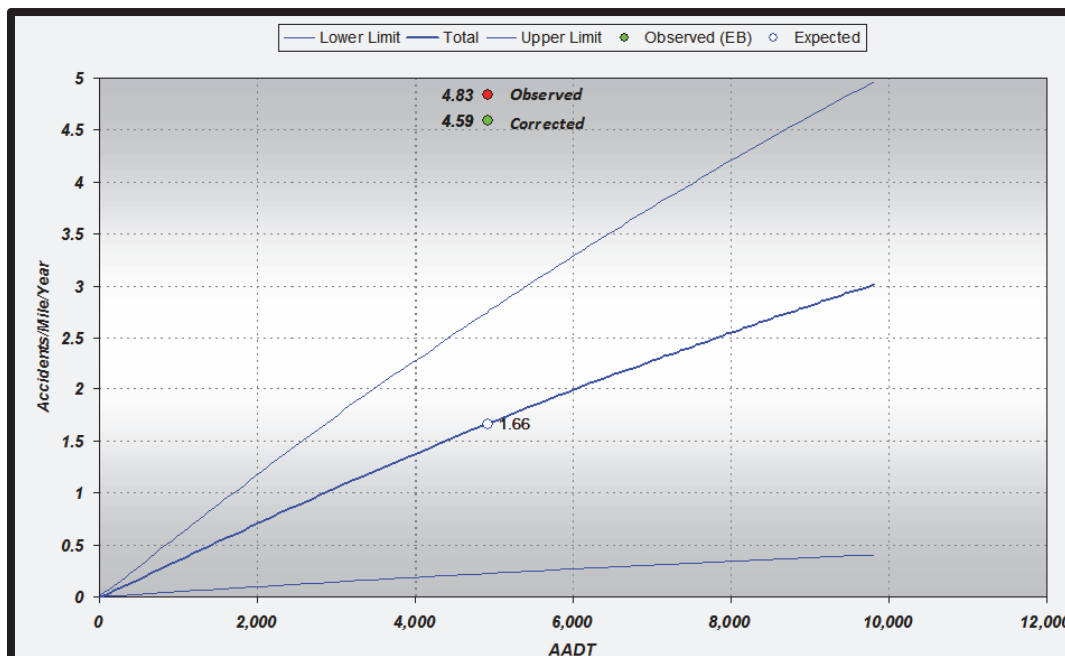


Figure 40 Montana SH 280 MP 0.08-2.00 (2008-2012) Observed and EB Corrected Safety Performance (SPF Total)

The following example shows application of the EB method to the crash history on I-90 MP 82.30-83.70. In this case only injury and fatal crashes are examined.

Observed accident frequency η is 1.57 acc/mile per year

Expected frequency μ is 0.53 acc/mile per year predicted by the Inj.+Fat SPF for 4-Lane Rural Freeways in Flat and Rolling terrain.

EB correction parameter $\phi = 1.793$ estimated from the SPF,

Number of years of crash history $n = 5$

$$\text{Weight (W)} = \frac{1}{1 + (\mu \times n) / \phi} = \frac{1}{1 + (0.53 \times 5) / 1.793} = .404$$

$$\text{EB Corrected Estimate} = W \times \mu + (1-W) \times \eta =$$

$$= 0.404 \times 0.53 + (1.00-0.404) \times 1.57 = 1.15 \text{ acc/mile per year}$$

SPF representing safety performance of I-90 between MP 82.30 and MP 83.70 with and without EB correction is provided on Figure 41. In this case the magnitude of correction is significant.

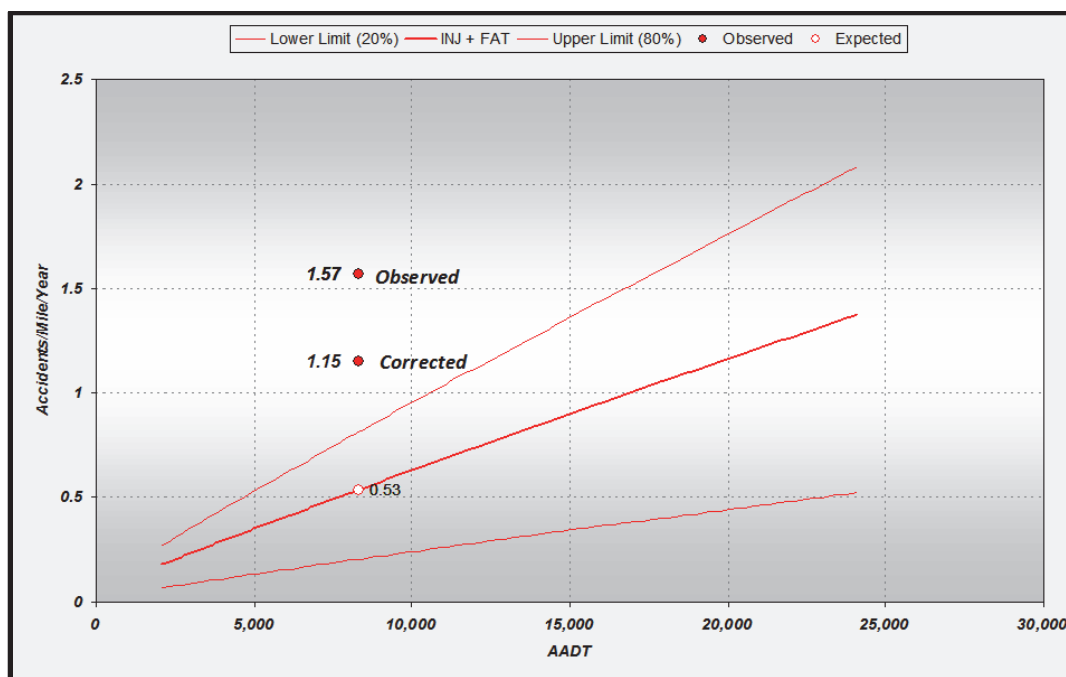


Figure 41 Montana I-90 MP 82.30-83.70 (2008-2012) Observed and EB Corrected Safety Performance (SPF Total)

LEVEL OF SERVICE OF SAFETY (LOSS)

Concept Description

Development of the SPF lends itself well to the conceptual formulation of the Level of Service of Safety (LOSS). The concept of level of service uses quantitative and qualitative measures that characterize safety of a roadway segment in reference to its expected performance and severity. If the level of safety predicted by the SPF will represent a normal or expected number of accidents at a specific level of AADT, then the degree of deviation from the norm can be stratified to represent specific levels of safety.

1. LOSS I - Indicates low potential for accident reduction
2. LOSS II - Indicates low to moderate potential for crash reduction
3. LOSS III - Indicates moderate to high potential for accident reduction
4. LOSS IV - Indicates high potential for accident reduction

Gradual increase in the degree of deviation of the LOSS boundary line from the fitted model mean reflects the observed increase of variability in APMPY as AADT increases. The delineated boundary lines represent 20th and 80th percentiles of the SPF population. Selection of the 20th and 80th percentiles is made to identify roadway segments with some potential for crash reduction or to recognize a particularly good performance.

Introduction of the LOSS concept enables transportation engineers to do the following:

- Qualitatively and quantitatively describe the degree of safety or un-safety of a roadway segment.
- Effectively communicate the magnitude of the safety problem to other professionals and elected officials.
- Bring the perception of roadway safety in line with the reality of safety performance for a specific facility.
- Provide a frame of reference for decision making on non-safety motivated projects (resurfacing or reconstruction, for instance).
- Provide a frame of reference from a safety perspective for planning major corridor improvements.

LOSS reflects how the roadway segment is performing in regard to its expected accident frequency and severity at a specific level of AADT. It only provides an accident frequency and severity comparison with the expected norm. It does not, however, provide any information related to the nature of the safety problem itself. If a safety problem is present, LOSS will only describe it's magnitude from a frequency and severity standpoint. The nature of the problem is determined through diagnostic analysis using Direct Diagnostics and Pattern Recognition techniques⁹.

⁹ Kononov, J., (2003) Identifying Locations with Potential for Accident Reduction: Use of Direct Diagnostics and Pattern Recognition Methodologies. In Transportation Research Record No. 1840, TRB, National Research Council, Washington, D.C. 2002, pp 57-66

Calibration of the Level of Service of Safety (LOSS) Boundaries

Safety Performance Function (SPF) is initially calibrated using original data, which is over-dispersed and is well described by the Negative Binomial distribution. In the process of calibration, the over-dispersion parameter is estimated from the data and serves to establish a “link” function between populations’s mean and its standard deviation. The relationship between standard deviation and the mean is described as follows:

$$\sigma = \sqrt{\mu + \alpha\mu^2}$$

Where:

μ - Expected frequency predicted by the SPF

α - Over-dispersion parameter estimated from the SPF

Over-dispersion is typical in the accident data, however when the magnitude of the problem is assessed, it is important to correct observed crash frequency for the regression to the mean bias using the Empirical Bayes (EB) procedure. The Empirical Bayes (EB) method for the estimation of safety increases the precision of estimation, it is based on combining the information contained in accident counts (known crash history) with the information contained in knowing the safety of similar entities. The information about safety of similar entities is brought into the EB procedure by the mean (μ) of the Safety Performance Function (SPF). When individual site is examined in the LOSS framework it is corrected for the RTM bias, therefore it is appropriate to compare its degree of deviation from the mean using the distribution reflecting the EB corrected population. When safety performance of all segments in the dataset is corrected for the RTM bias using the EB procedure the resulting population will naturally have a smaller variance than before correction. EB corrected population is described by the Gamma distribution where the relationship between the mean and standard deviation is as follows:

$$\sigma = \sqrt{\alpha\mu^2}$$

LOSS boundaries were then calibrated by computing the 20th and the 80th percentiles using the Gamma Distribution Probability Density Function below:

$$f(\mu) = \frac{a^b \mu^{b-1} e^{-a\mu}}{\Gamma(b)}$$

where:

μ - the mean

b - dispersion parameter estimated from the regression

$a = b/\mu$

Γ – Gamma Function

Figure 42 shows SPF and LOSS graph for total crashes and Figure 43 for Injury and Fatal Crashes only for the Montana 4-Lane Rural Freeways.

SPF graphs with incremental means and corresponding LOSS boundary values for all Montana roads are provided in the Appendix.

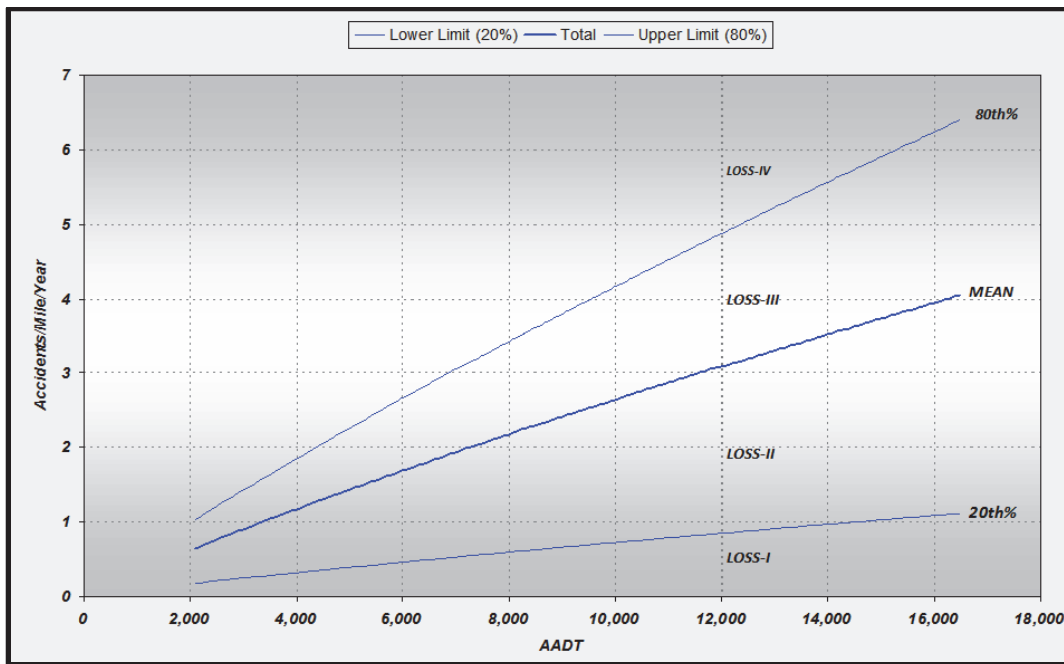


Figure 42 SPF with LOSS Boundaries Total Crashes Graph of 4 Lane Rural Flat and Rolling Freeways

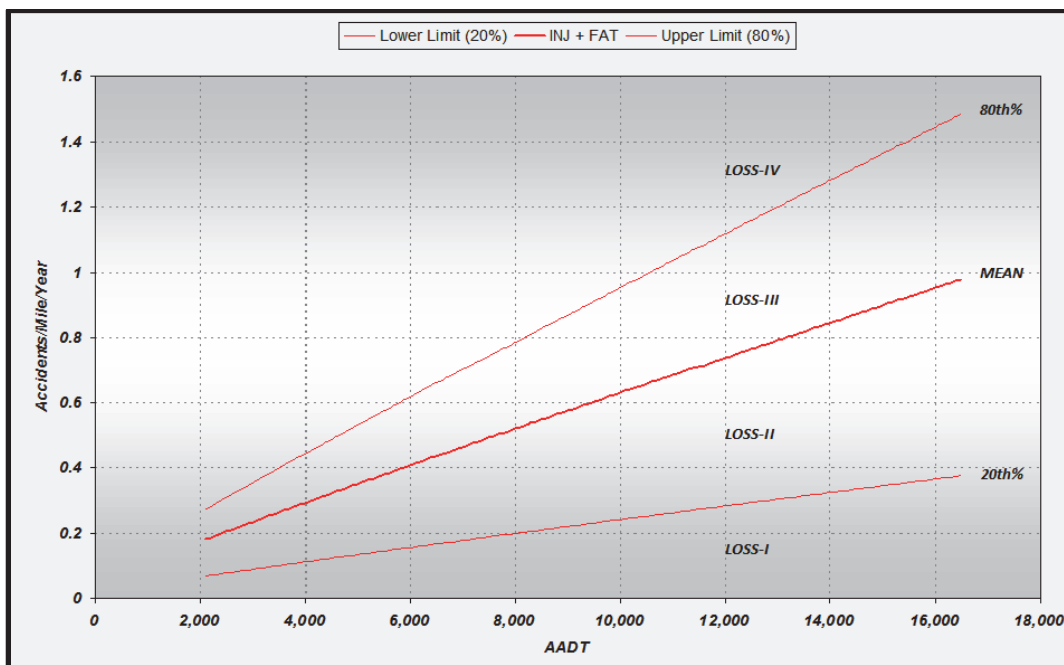


Figure 43 SPF with LOSS Boundaries Inj+Fat Crashes Graph of 4 Lane Rural Flat and Rolling Freeways

PATTERN RECOGNITION ANALYSIS AND DIRECT DIAGNOSTICS METHODOLOGIES

In the course of in-depth project-level safety studies of hundreds of locations, a comprehensive methodology was developed to conduct diagnostic analysis of safety problems for different classes of roads in various Montana environments. Direct diagnostics methods and a pattern recognition algorithm are described by Kononov² and Kononov and Janson¹⁰.

Because traffic accidents can be viewed as random Bernoulli trials, it is possible to detect deviations from the random statistical process by computing the observed cumulative probability for each of the normative parameters. This continuous testing for deviations from the norms was achieved using a pattern recognition algorithm. The process of continuous pattern recognition was used to delineate boundaries of “abnormal” accident occurrence within the project limits on Montana state highways. Reference framework for the continuous pattern recognition analysis is provided on Figure 43.

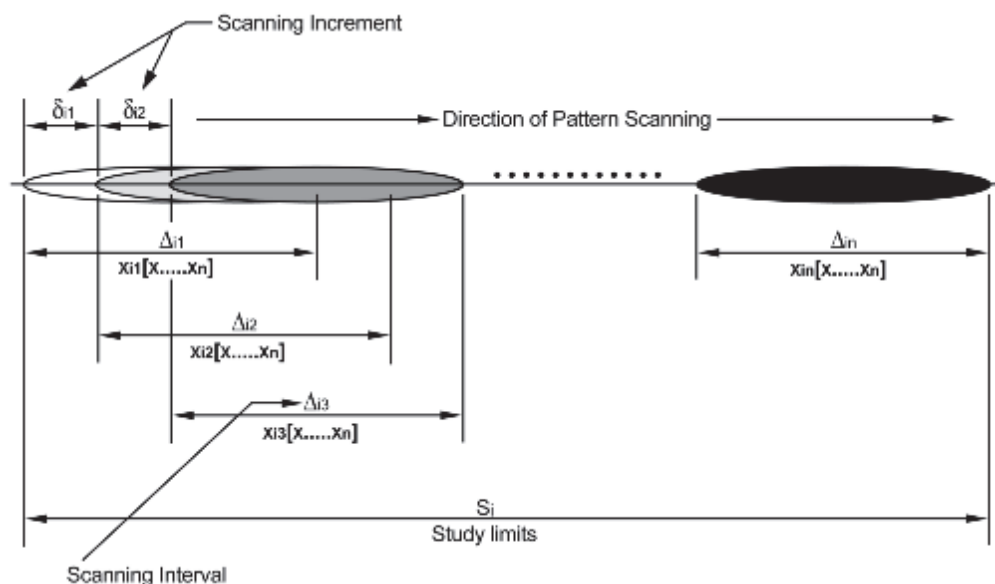


Figure 43 – Reference Framework for Continuous Pattern Recognition

A pattern recognition process can be described as follows:

Select scanning interval $\Delta_i = \Delta_1 = \Delta_2 = \dots \Delta_n$

Scanning interval is generally 1 mile for the analysis of roadway segments in rural areas. Selection of the scanning interval is data driven and can be extended beyond 1 mile in areas with low AADT and reduced in the areas of high AADT.

Select a scanning increment $\delta_i = \delta_1 = \delta_2 = \dots \delta_n$

The scanning increment is also data driven and is generally in the range between 0.01 and 0.10 miles. A scanning increment of 0.10 miles was found adequate for most roadway Montana environments. Obtain feature vector $x_{i1}\{x_1 \dots x_n\}$ reflecting accident history and its attributes within segment interval Δ_1 .

¹⁰ Kononov, J. and Janson, B. (2003) Diagnostic Methodology for the Detection of Safety Problems at Intersections. In Transportation Research Record No. 1840, TRB, National Research Council, Washington, D.C. 2002, pp 51-56.

Identify the number of total accidents nt_i and the number of accidents of specific type n_{i1} contained within selected feature vector $x_{i1}\{x...x_n\}$.

Select the appropriate p_i reflecting the Bernoulli probability (diagnostic norm) of success for each trial related to pattern I and representing the expected attributes within Safety Performance Function (SPF_i).

Select critical value P_α for making classification decisions $P_\alpha = 0.99$, for most cases; when identifying patterns in the areas with low AADT, $P_\alpha = 0.95$ may be used.

Compute:

$$P(SPF_i/n_i) =$$

$$P(X \leq x) = B(x, n; p) = \sum_{i=0}^x \frac{n!}{(n-i)!i!} p^i (1-p)^{n-i}$$

If $P(SPF_i / n_i) < P_\alpha$ (preselected), then the classification decision is made that:

$$\Delta_1 \left[\begin{matrix} x\{x...x_n\} \\ n_{i1} / n_{t1} \end{matrix} \right] \notin SPF_i$$

If $P(SPF_i / n_i) > P_\alpha$ (preselected), then the classification decision is made that:

$$\Delta_1 \left[\begin{matrix} x\{x...x_n\} \\ n_{i1} / n_{t1} \end{matrix} \right] \in SPF_i$$

Following the completion of the first pattern recognition cycle, the scanning interval is shifted a predetermined incremental distance. At the second position a feature vector reflecting accident history attributes of the selected interval is obtained and $P(SPF_i/n_{i2})$ is computed and a second classification decision is made. In this incremental fashion the entire distance S representing project limits is tested for the presence of all possible accident patterns.

A framework of normative parameters was developed specifically for the Montana highways to provide a knowledge base for the diagnostic analysis. These parameters can be grouped into the following general categories: accident type, severity, accident location, road condition, direction of travel, lighting condition, vehicle type, human factors, driver condition, weather condition, and time of day. It is important to note that some, but not all, normative parameters within the same SPF change with AADT. For instance, in general, the severity of accidents gradually decreases and the distribution of accidents by accident type changes with AADT. With this in mind, normative parameters were stratified for three ranges of AADT: low, medium and high, when AADT used to calibrate the SPF contained all three categories. In the process of assessing the nature and magnitude of safety problems at specific locations, SPF analysis should be used in conjunction with an appropriate diagnostic investigation by using the pattern recognition algorithm. The stratification of the diagnostic parameters by AADT improves the ability to identify accident patterns more accurately. Stratified diagnostic norms for all Montana SPFs are provided in the Appendix.

While LOSS provides a means of assessment of the magnitude of the safety problem, it is important to understand that accident patterns susceptible to correction may exist with or without over-representation in total frequency, as detected by SPF. These patterns should be identified through diagnostic analysis.

Application of Pattern Recognition Methodology

Case-1 Frequency and severity of crashes are above normal and crash patterns are detectable by direct diagnostics.

To illustrate the use of the pattern recognition methodology we will examine Montana SH263 between MP4.50 and MP9.00. Within study limits SH263 is a 2-Lane Rural Collector just outside of Missoula. SPF analysis shows elevated frequency and severity of crashes reflected by the LOSS-IV (Figures 45-46). Direct diagnostic analysis shows that the number of alcohol related crashes is highly abnormal. 14 out of 56 crashes (25%) (Figure 44) involved use of alcohol, when the average for this type of road in Montana is only 8.8%

$$P(X \leq x) = B(x, n, p) = \sum_{i=0}^x \frac{n!}{(n-i)!i!} p^i (1-p)^{n-i}$$

Where:

n – Total number of crashes (56)

x – Number of observed crashes involving alcohol (14)

p – Expected % of alcohol related crashes based on statewide statistics (8.8%)

$$P(X \leq 14, n=56, p=8.8\%) = .9999$$

Such a high cumulative probability of observing 14 or fewer crashes involving use of alcohol out 56 total accidents suggests that elevated frequency and severity of crashes may be related to drinking and driving.

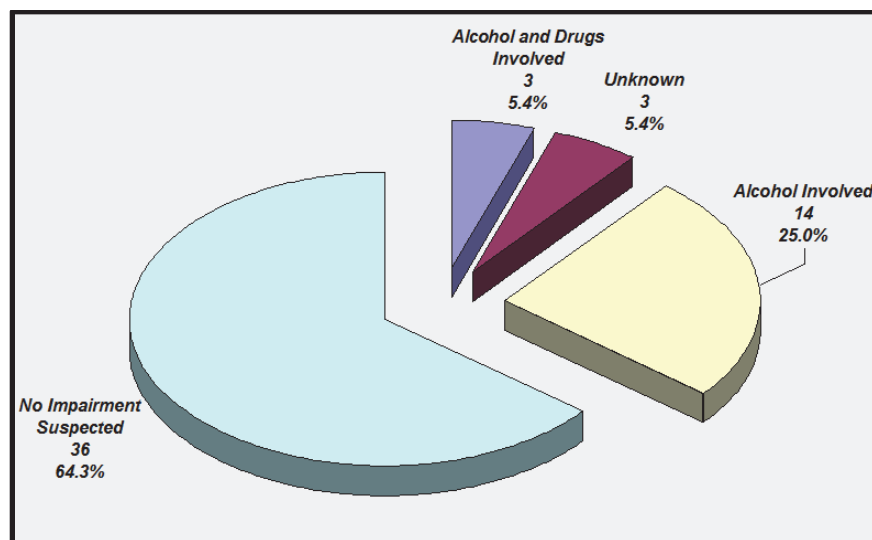


Figure 44 SH263 MP4.50-9.00 Distribution of Crashes by Driver's Condition

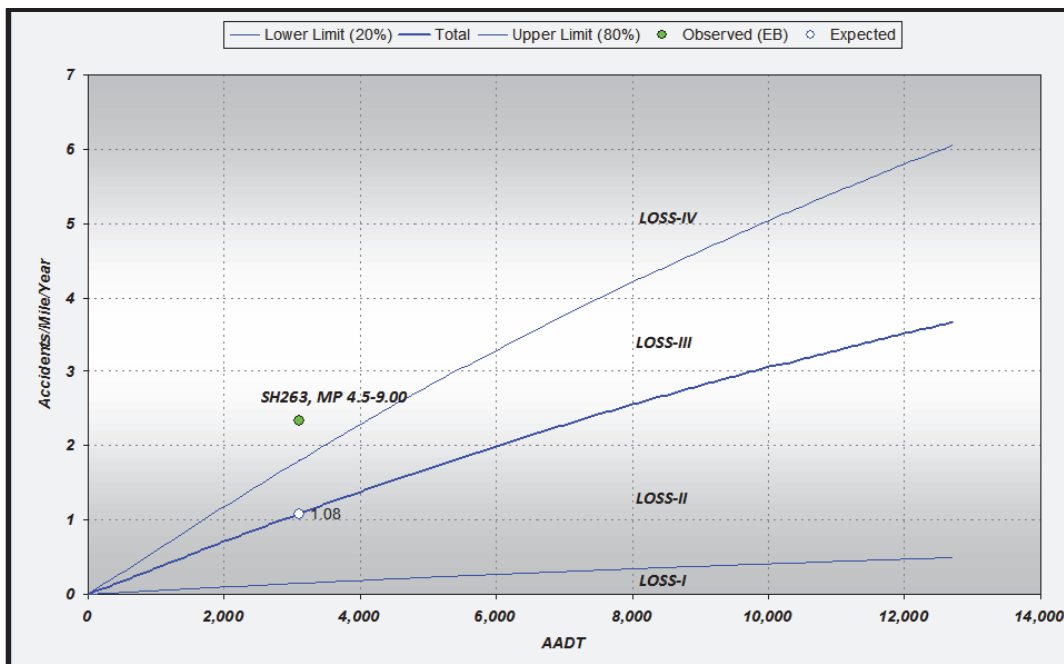


Figure 45 SH263 MP 4.50-9.00 EB Corrected SPF Total

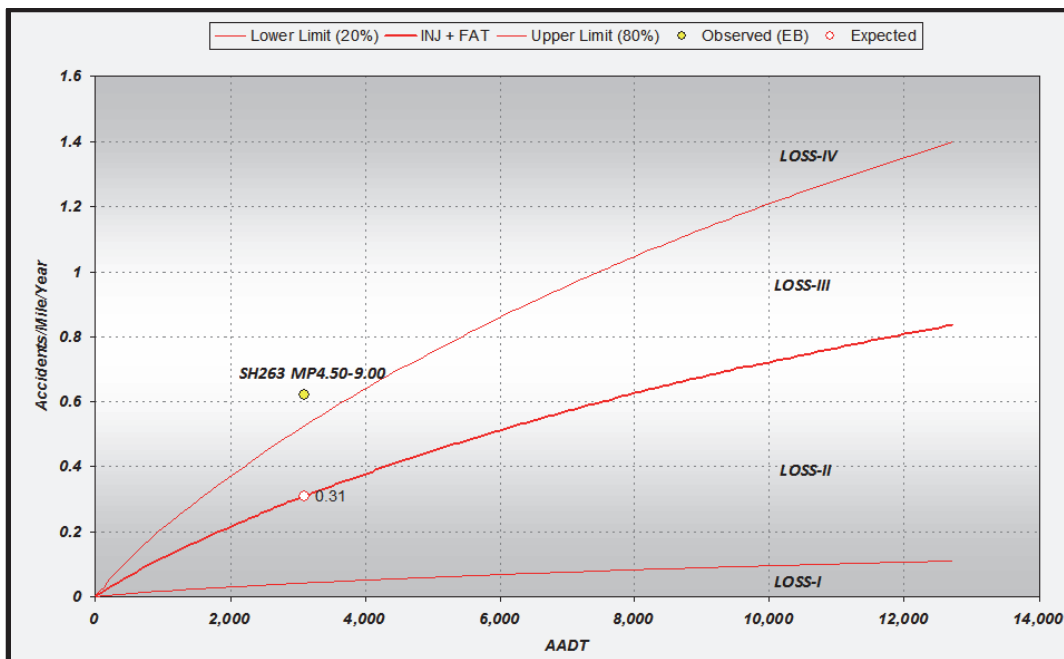


Figure 46 SH263 MP 4.50-9.00 EB Corrected SPF Total

Case-2 Frequency and severity of crashes are normal and crash patterns are not detectable by direct diagnostics.

To illustrate pattern recognition analysis for Case-2 we will examine SH 74 in Colorado between MP 8.00 and MP 11.80. SH 74 is a 2-lane rural mountainous highway in Colorado with AADT of 6,650 vehicles per day. SPF analysis (Figures 47 and 48) shows that it is performing at LOSS-II and suggests only low to moderate potential for crash reduction.

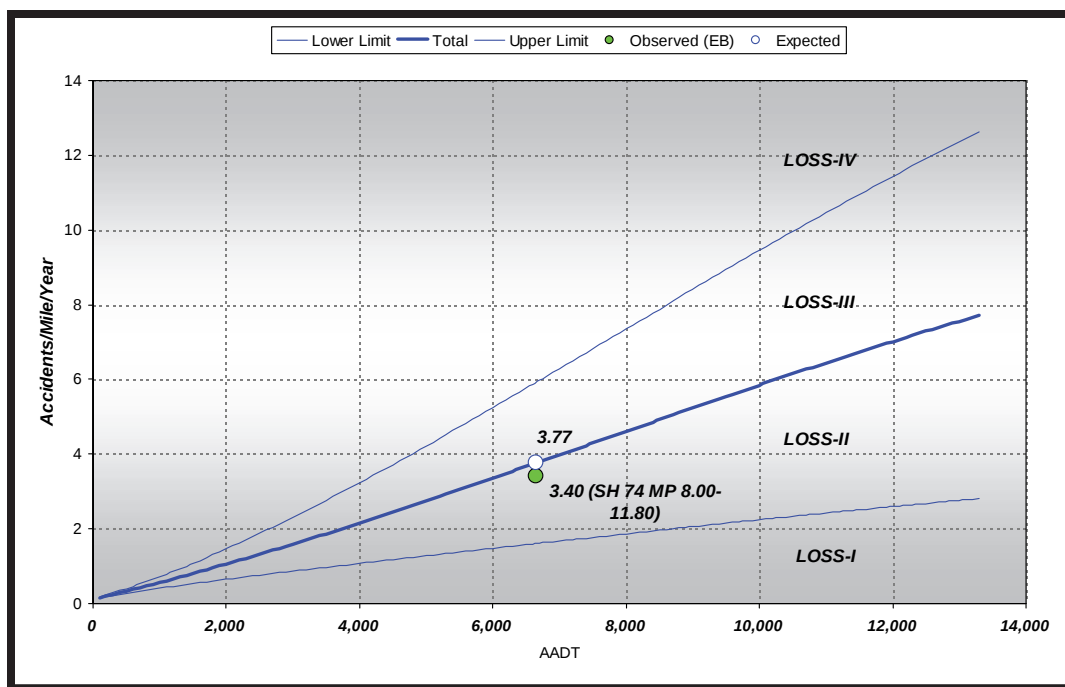


Figure 47 SH 74 MP 8.00-11.80 SPF Total EB corrected

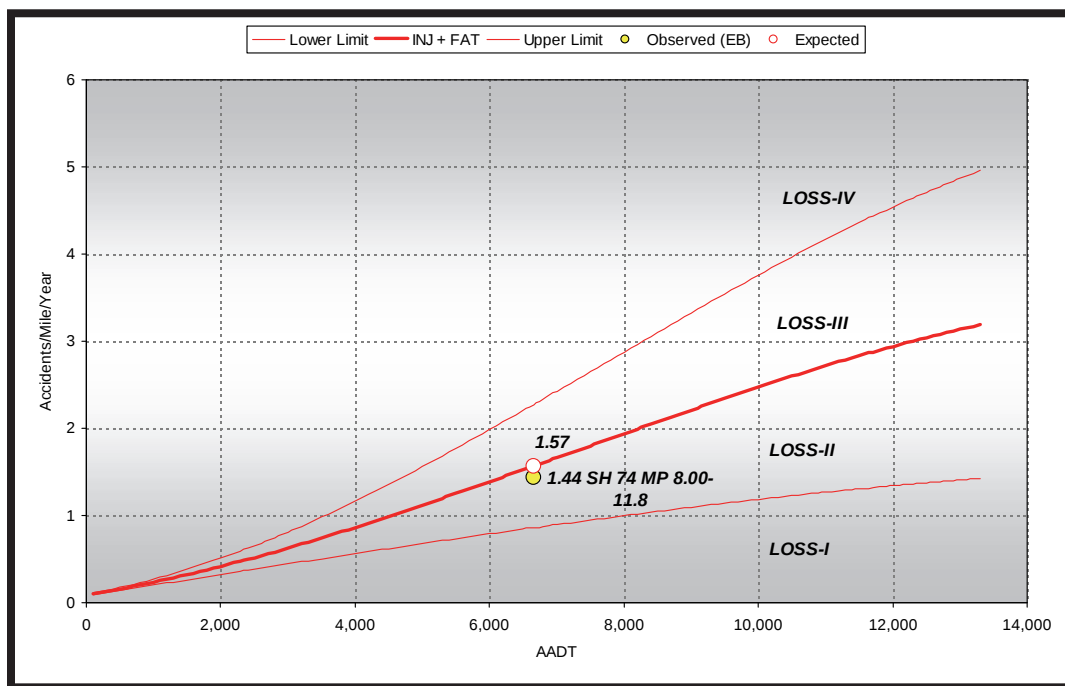


Figure 48 SH 74 MP 8.00-11.80 SPF Inj + Fat EB corrected

Direct diagnostic analysis shows no abnormalities, even though dark unlighted crashes are elevated (30 out of 63), they are certainly not abnormal considering that the norm is 41.7%.

$$P(X \leq x) = B(x, n; p) = \sum_{i=0}^x \frac{n!}{(n-i)!i!} p^i (1-p)^{n-i}$$

Where:

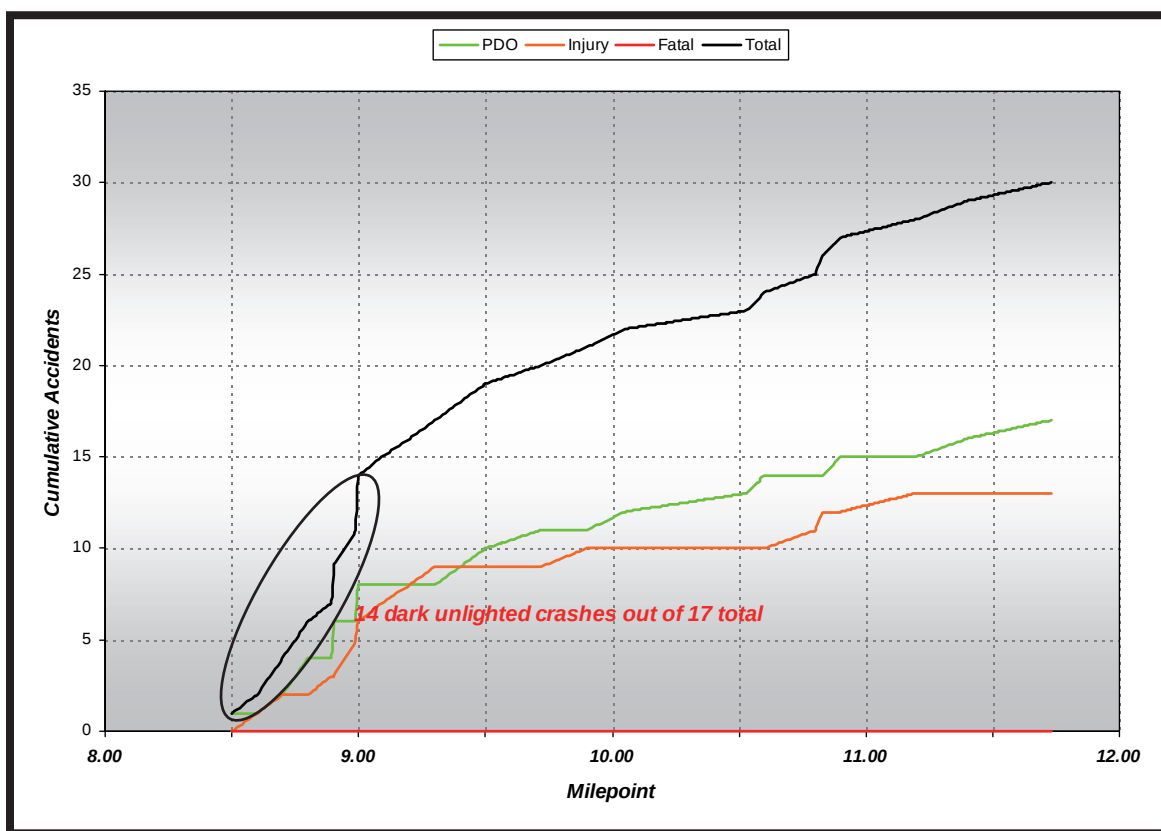
n – Total number of crashes (63)

x – Number of observed dark-unlighted crashes (30)

p – Expected % of approach turn crashes based on statewide statistics (41.7%)

$$P(X \leq 30, n=63, p=41.7\%) = 0.86$$

Although a direct diagnostics test showed that overall crashes under dark-unlighted conditions are not over-represented between MP 8.00 and MP 11.80, we may still experience localized safety problems related to night time visibility. The cumulative graph of accidents when dark presented on Figure 14 reveals a sizable concentration of accidents between MP 8.50 and 9.00 where 14 out 17 accidents occurred under dark unlighted conditions.



**Figure 14 Cumulative Graph of Crashes under Dark-Unlighted Condition
SH 74, MP 8.00-MP 11.80**

We can now test for the presence of a nighttime crash pattern using direct diagnostics:

$$P(X \leq x) = B(x, n; p) = \sum_{i=0}^x \frac{n!}{(n-i)!i!} p^i (1-p)^{n-i}$$

Where:

n – Total number of crashes (17)

x – Number of observed dark-unlighted crashes (14)

p – Expected % of approach turn crashes based on statewide statistics (41.7%)

$$P(X \leq 14, n=17, p=41.7\%) = 0.999$$

Such high cumulative probability of observing 14 or fewer crashes under dark unlighted conditions strongly suggest, that there is something in the roadway environment between mileposts 8.50 and 9.00 that triggers nighttime accidents. A nighttime field visit revealed that curve signing on numerous curves between mileposts 8.50 and 9.00 had no nighttime retroreflectivity and no curve delineation was installed. ***This example illustrates that crash patterns susceptible to correction may be present without over-representation in frequency or severity and may not be detectable through direct diagnostic analysis of the entire segment.***

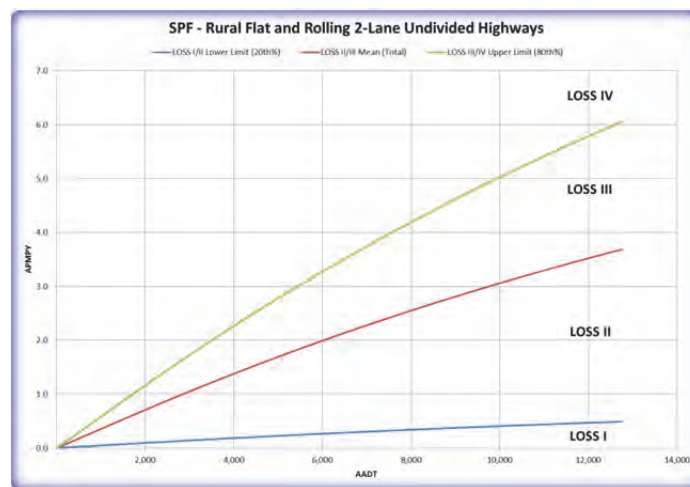
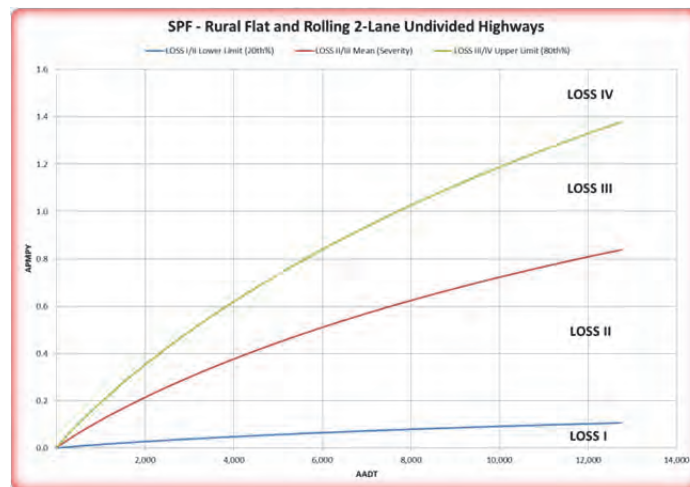
CONCLUSIONS

This report describes the development of Montana-Specific Safety Knowledge Base. Its use will enable Montana Department of Transportation (MDT) to identify existing safety problems with greater accuracy and effectiveness. DiExSys approach presented in this report is based on sophisticated yet highly practical methodology designed to provide decision support analysis for solving roadway safety problems at the system and project levels. Proposed methodology will support optimal investment of limited resources which will result in greater accident reduction. DiExSys process provides a platform for the project level decision support analysis, planning of system level improvements and risk management. When applied statewide, this approach is expected to provide maximum safety improvements on Montana highways within constraints of construction budget allocations. Use of the proposed methodology is intended to assist MDT management and staff in making decisions effecting safety of the traveling public.

APPENDIX

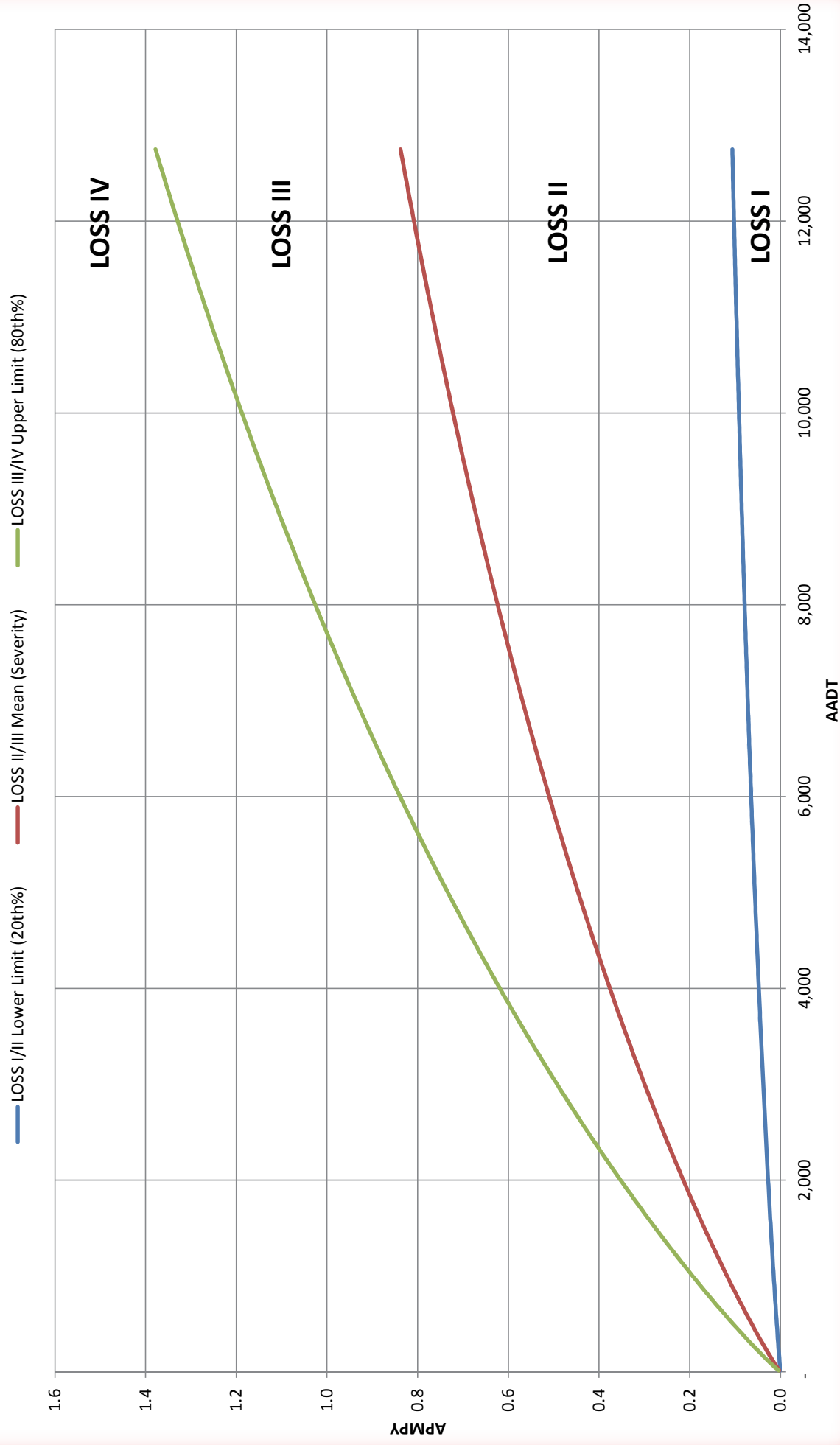


Montana Rural Flat and Rolling 2-Lane UnDivided Highways



SPF, LOSS, and Diagnostic Norms

SPF - Rural Flat and Rolling 2-Lane Undivided Highways



Model:

SPF - Rural Flat and Rolling 2-Lane Undivided Highways

Dispersion (Alpha) = 1.4614E+00

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
15	0.0003	0.0025	0.0041
50	0.0010	0.0076	0.0126
100	0.0018	0.0145	0.0239
150	0.0027	0.0211	0.0347
200	0.0035	0.0275	0.0452
250	0.0043	0.0337	0.0555
300	0.0050	0.0398	0.0655
350	0.0058	0.0458	0.0754
400	0.0066	0.0518	0.0852
450	0.0073	0.0576	0.0948
500	0.0080	0.0634	0.1042
550	0.0087	0.0691	0.1136
600	0.0095	0.0747	0.1229
650	0.0102	0.0803	0.1320
700	0.0109	0.0858	0.1411
750	0.0116	0.0912	0.1500
800	0.0122	0.0966	0.1589
850	0.0129	0.1020	0.1677
900	0.0136	0.1073	0.1764
950	0.0143	0.1125	0.1851
1,000	0.0149	0.1177	0.1937
1,050	0.0156	0.1229	0.2022
1,100	0.0162	0.1280	0.2106
1,150	0.0169	0.1331	0.2190
1,200	0.0175	0.1382	0.2273
1,250	0.0181	0.1432	0.2355
1,300	0.0188	0.1481	0.2437
1,350	0.0194	0.1531	0.2518
1,400	0.0200	0.1580	0.2598
1,450	0.0206	0.1628	0.2678
1,500	0.0212	0.1677	0.2758
1,550	0.0218	0.1725	0.2837
1,600	0.0224	0.1772	0.2915
1,650	0.0230	0.1820	0.2993
1,700	0.0236	0.1867	0.3070
1,750	0.0242	0.1913	0.3147
1,800	0.0248	0.1960	0.3224
1,850	0.0254	0.2006	0.3299
1,900	0.0260	0.2052	0.3375
1,950	0.0266	0.2097	0.3450
2,000	0.0271	0.2142	0.3524
2,050	0.0277	0.2187	0.3598
2,100	0.0283	0.2232	0.3672
2,150	0.0288	0.2277	0.3745

Model:

SPF - Rural Flat and Rolling 2-Lane Undivided Highways

Dispersion (Alpha) = 1.4614E+00

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
2,200	0.0294	0.2321	0.3817
2,250	0.0299	0.2365	0.3890
2,300	0.0305	0.2408	0.3961
2,350	0.0310	0.2452	0.4033
2,400	0.0316	0.2495	0.4104
2,450	0.0321	0.2538	0.4174
2,500	0.0327	0.2580	0.4245
2,550	0.0332	0.2623	0.4314
2,600	0.0338	0.2665	0.4384
2,650	0.0343	0.2707	0.4453
2,700	0.0348	0.2749	0.4521
2,750	0.0353	0.2790	0.4590
2,800	0.0359	0.2832	0.4658
2,850	0.0364	0.2873	0.4725
2,900	0.0369	0.2913	0.4792
2,950	0.0374	0.2954	0.4859
3,000	0.0379	0.2994	0.4926
3,050	0.0384	0.3035	0.4992
3,100	0.0389	0.3075	0.5058
3,150	0.0394	0.3114	0.5123
3,200	0.0399	0.3154	0.5188
3,250	0.0404	0.3193	0.5253
3,300	0.0409	0.3233	0.5317
3,350	0.0414	0.3272	0.5382
3,400	0.0419	0.3310	0.5445
3,450	0.0424	0.3349	0.5509
3,500	0.0429	0.3387	0.5572
3,550	0.0434	0.3426	0.5635
3,600	0.0439	0.3464	0.5697
3,650	0.0443	0.3502	0.5760
3,700	0.0448	0.3539	0.5822
3,750	0.0453	0.3577	0.5883
3,800	0.0458	0.3614	0.5945
3,850	0.0462	0.3651	0.6006
3,900	0.0467	0.3688	0.6066
3,950	0.0472	0.3725	0.6127
4,000	0.0476	0.3761	0.6187
4,050	0.0481	0.3798	0.6247
4,100	0.0486	0.3834	0.6307
4,150	0.0490	0.3870	0.6366
4,200	0.0495	0.3906	0.6425
4,250	0.0499	0.3942	0.6484
4,300	0.0504	0.3977	0.6542
4,350	0.0508	0.4013	0.6601

Model:

SPF - Rural Flat and Rolling 2-Lane Undivided Highways

Dispersion (Alpha) = 1.4614E+00

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
4,400	0.0513	0.4048	0.6659
4,450	0.0517	0.4083	0.6717
4,500	0.0522	0.4118	0.6774
4,550	0.0526	0.4153	0.6831
4,600	0.0530	0.4188	0.6888
4,650	0.0535	0.4222	0.6945
4,700	0.0539	0.4256	0.7001
4,750	0.0543	0.4291	0.7058
4,800	0.0548	0.4325	0.7114
4,850	0.0552	0.4358	0.7169
4,900	0.0556	0.4392	0.7225
4,950	0.0561	0.4426	0.7280
5,000	0.0565	0.4459	0.7335
5,050	0.0569	0.4492	0.7390
5,100	0.0573	0.4526	0.7444
5,150	0.0577	0.4559	0.7499
5,200	0.0581	0.4591	0.7553
5,250	0.0586	0.4624	0.7606
5,300	0.0590	0.4657	0.7660
5,350	0.0594	0.4689	0.7713
5,400	0.0598	0.4722	0.7767
5,450	0.0602	0.4754	0.7819
5,500	0.0606	0.4786	0.7872
5,550	0.0610	0.4818	0.7925
5,600	0.0614	0.4849	0.7977
5,650	0.0618	0.4881	0.8029
5,700	0.0622	0.4913	0.8081
5,750	0.0626	0.4944	0.8132
5,800	0.0630	0.4975	0.8184
5,850	0.0634	0.5006	0.8235
5,900	0.0638	0.5037	0.8286
5,950	0.0642	0.5068	0.8337
6,000	0.0646	0.5099	0.8387
6,050	0.0650	0.5130	0.8438
6,100	0.0654	0.5160	0.8488
6,150	0.0657	0.5190	0.8538
6,200	0.0661	0.5221	0.8588
6,250	0.0665	0.5251	0.8637
6,300	0.0669	0.5281	0.8687
6,350	0.0673	0.5311	0.8736
6,400	0.0676	0.5341	0.8785
6,450	0.0680	0.5370	0.8834
6,500	0.0684	0.5400	0.8882
6,550	0.0688	0.5429	0.8931

Model:

SPF - Rural Flat and Rolling 2-Lane Undivided Highways

Dispersion (Alpha) = 1.4614E+00

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
6,600	0.0691	0.5459	0.8979
6,650	0.0695	0.5488	0.9027
6,700	0.0699	0.5517	0.9075
6,750	0.0702	0.5546	0.9122
6,800	0.0706	0.5575	0.9170
6,850	0.0710	0.5603	0.9217
6,900	0.0713	0.5632	0.9264
6,950	0.0717	0.5661	0.9311
7,000	0.0720	0.5689	0.9358
7,050	0.0724	0.5717	0.9405
7,100	0.0728	0.5746	0.9451
7,150	0.0731	0.5774	0.9497
7,200	0.0735	0.5802	0.9543
7,250	0.0738	0.5830	0.9589
7,300	0.0742	0.5857	0.9635
7,350	0.0745	0.5885	0.9680
7,400	0.0749	0.5913	0.9726
7,450	0.0752	0.5940	0.9771
7,500	0.0756	0.5967	0.9816
7,550	0.0759	0.5995	0.9861
7,600	0.0763	0.6022	0.9905
7,650	0.0766	0.6049	0.9950
7,700	0.0769	0.6076	0.9994
7,750	0.0773	0.6103	1.0039
7,800	0.0776	0.6130	1.0083
7,850	0.0780	0.6156	1.0127
7,900	0.0783	0.6183	1.0170
7,950	0.0786	0.6209	1.0214
8,000	0.0790	0.6236	1.0257
8,050	0.0793	0.6262	1.0300
8,100	0.0796	0.6288	1.0344
8,150	0.0800	0.6314	1.0387
8,200	0.0803	0.6340	1.0429
8,250	0.0806	0.6366	1.0472
8,300	0.0810	0.6392	1.0514
8,350	0.0813	0.6418	1.0557
8,400	0.0816	0.6443	1.0599
8,450	0.0819	0.6469	1.0641
8,500	0.0823	0.6494	1.0683
8,550	0.0826	0.6520	1.0725
8,600	0.0829	0.6545	1.0766
8,650	0.0832	0.6570	1.0808
8,700	0.0835	0.6595	1.0849
8,750	0.0838	0.6620	1.0890

Model:

SPF - Rural Flat and Rolling 2-Lane Undivided Highways

Dispersion (Alpha) = 1.4614E+00

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
8,800	0.0842	0.6645	1.0931
8,850	0.0845	0.6670	1.0972
8,900	0.0848	0.6695	1.1013
8,950	0.0851	0.6720	1.1053
9,000	0.0854	0.6744	1.1094
9,050	0.0857	0.6769	1.1134
9,100	0.0860	0.6793	1.1174
9,150	0.0863	0.6818	1.1214
9,200	0.0866	0.6842	1.1254
9,250	0.0870	0.6866	1.1294
9,300	0.0873	0.6890	1.1334
9,350	0.0876	0.6914	1.1373
9,400	0.0879	0.6938	1.1413
9,450	0.0882	0.6962	1.1452
9,500	0.0885	0.6986	1.1491
9,550	0.0888	0.7009	1.1530
9,600	0.0891	0.7033	1.1569
9,650	0.0894	0.7057	1.1607
9,700	0.0897	0.7080	1.1646
9,750	0.0900	0.7103	1.1684
9,800	0.0903	0.7127	1.1723
9,850	0.0906	0.7150	1.1761
9,900	0.0908	0.7173	1.1799
9,950	0.0911	0.7196	1.1837
10,000	0.0914	0.7219	1.1875
10,050	0.0917	0.7242	1.1913
10,100	0.0920	0.7265	1.1950
10,150	0.0923	0.7288	1.1988
10,200	0.0926	0.7310	1.2025
10,250	0.0929	0.7333	1.2062
10,300	0.0932	0.7355	1.2099
10,350	0.0934	0.7378	1.2136
10,400	0.0937	0.7400	1.2173
10,450	0.0940	0.7423	1.2210
10,500	0.0943	0.7445	1.2246
10,550	0.0946	0.7467	1.2283
10,600	0.0948	0.7489	1.2319
10,650	0.0951	0.7511	1.2355
10,700	0.0954	0.7533	1.2392
10,750	0.0957	0.7555	1.2428
10,800	0.0960	0.7577	1.2464
10,850	0.0962	0.7599	1.2499
10,900	0.0965	0.7620	1.2535
10,950	0.0968	0.7642	1.2571

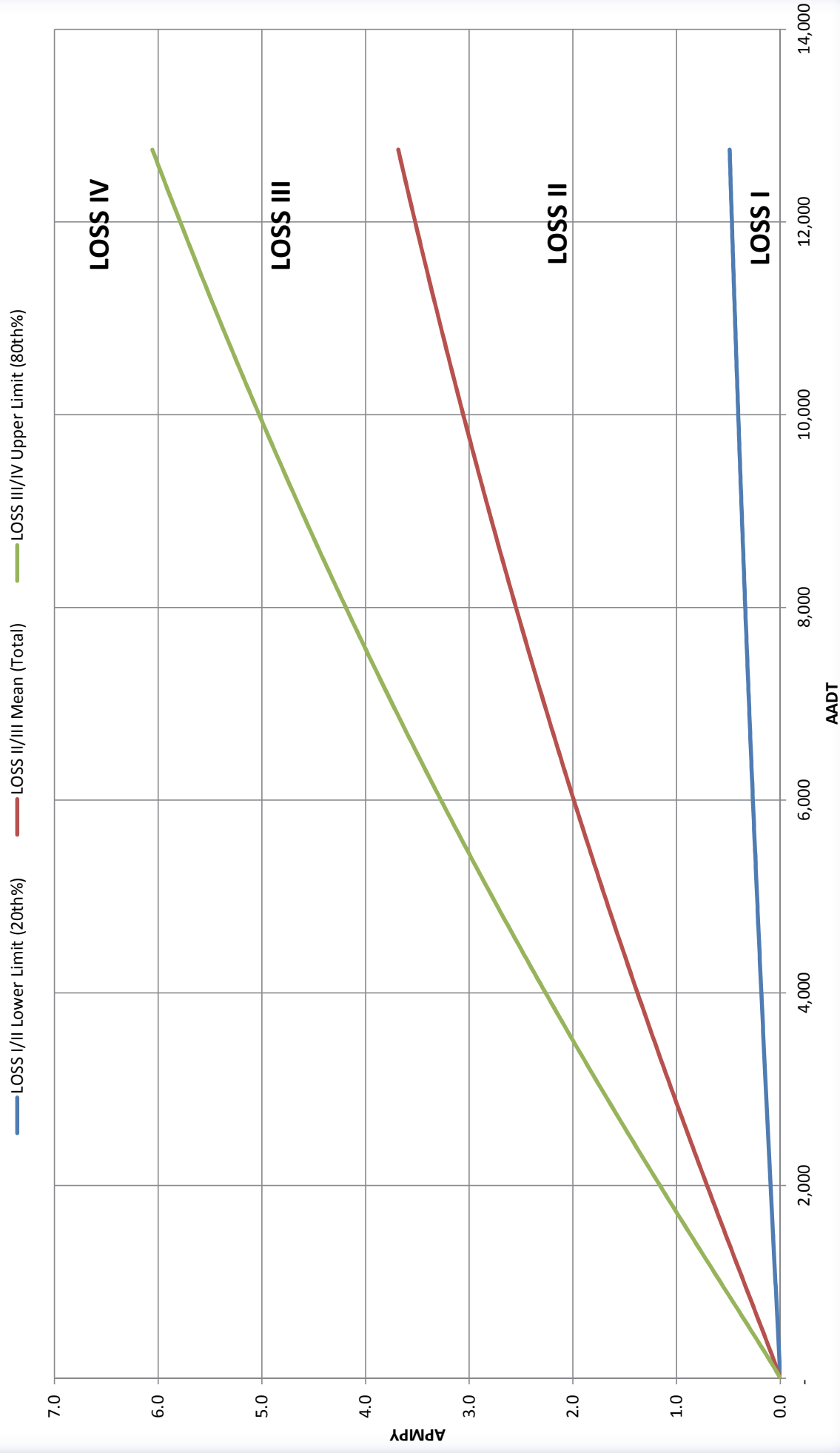
Model:

SPF - Rural Flat and Rolling 2-Lane Undivided Highways

Dispersion (Alpha) = 1.4614E+00

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
11,000	0.0971	0.7664	1.2606
11,050	0.0973	0.7685	1.2641
11,100	0.0976	0.7707	1.2677
11,150	0.0979	0.7728	1.2712
11,200	0.0981	0.7749	1.2747
11,250	0.0984	0.7770	1.2782
11,300	0.0987	0.7792	1.2817
11,350	0.0989	0.7813	1.2851
11,400	0.0992	0.7834	1.2886
11,450	0.0995	0.7855	1.2920
11,500	0.0997	0.7876	1.2955
11,550	0.1000	0.7896	1.2989
11,600	0.1003	0.7917	1.3023
11,650	0.1005	0.7938	1.3057
11,700	0.1008	0.7959	1.3091
11,750	0.1011	0.7979	1.3125
11,800	0.1013	0.8000	1.3159
11,850	0.1016	0.8020	1.3192
11,900	0.1018	0.8040	1.3226
11,950	0.1021	0.8061	1.3259
12,000	0.1023	0.8081	1.3293
12,050	0.1026	0.8101	1.3326
12,100	0.1029	0.8121	1.3359
12,150	0.1031	0.8141	1.3392
12,200	0.1034	0.8161	1.3425
12,250	0.1036	0.8181	1.3458
12,300	0.1039	0.8201	1.3491
12,350	0.1041	0.8221	1.3523
12,400	0.1044	0.8241	1.3556
12,450	0.1046	0.8261	1.3588
12,500	0.1049	0.8280	1.3621
12,550	0.1051	0.8300	1.3653
12,600	0.1054	0.8320	1.3685
12,650	0.1056	0.8339	1.3717
12,700	0.1059	0.8358	1.3749
12,750	0.1061	0.8378	1.3781

SPF - Rural Flat and Rolling 2-Lane Undivided Highways



Model:

SPF - Rural Flat and Rolling 2-Lane Undivided Highways

Dispersion (Alpha) = 1.4247E+00

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
15	0.0006	0.0044	0.0073
50	0.0021	0.0156	0.0257
100	0.0043	0.0323	0.0530
150	0.0065	0.0493	0.0810
200	0.0088	0.0666	0.1094
250	0.0111	0.0840	0.1380
300	0.0135	0.1015	0.1669
350	0.0158	0.1192	0.1959
400	0.0181	0.1369	0.2250
450	0.0205	0.1546	0.2542
500	0.0229	0.1725	0.2835
550	0.0252	0.1903	0.3128
600	0.0276	0.2082	0.3422
650	0.0300	0.2261	0.3716
700	0.0323	0.2440	0.4010
750	0.0347	0.2619	0.4305
800	0.0371	0.2798	0.4599
850	0.0395	0.2977	0.4894
900	0.0418	0.3157	0.5189
950	0.0442	0.3336	0.5483
1,000	0.0466	0.3515	0.5777
1,050	0.0490	0.3694	0.6072
1,100	0.0513	0.3873	0.6366
1,150	0.0537	0.4052	0.6660
1,200	0.0561	0.4230	0.6953
1,250	0.0584	0.4409	0.7247
1,300	0.0608	0.4587	0.7540
1,350	0.0632	0.4765	0.7832
1,400	0.0655	0.4943	0.8125
1,450	0.0679	0.5121	0.8417
1,500	0.0702	0.5298	0.8708
1,550	0.0726	0.5476	0.9000
1,600	0.0749	0.5652	0.9291
1,650	0.0773	0.5829	0.9581
1,700	0.0796	0.6006	0.9871
1,750	0.0819	0.6182	1.0161
1,800	0.0843	0.6358	1.0450
1,850	0.0866	0.6533	1.0738
1,900	0.0889	0.6709	1.1027
1,950	0.0912	0.6884	1.1314
2,000	0.0936	0.7058	1.1601
2,050	0.0959	0.7233	1.1888
2,100	0.0982	0.7407	1.2174
2,150	0.1005	0.7581	1.2460

Model:

SPF - Rural Flat and Rolling 2-Lane Undivided Highways

Dispersion (Alpha) = 1.4247E+00

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
2,200	0.1028	0.7754	1.2745
2,250	0.1051	0.7927	1.3030
2,300	0.1074	0.8100	1.3314
2,350	0.1097	0.8273	1.3597
2,400	0.1119	0.8445	1.3880
2,450	0.1142	0.8617	1.4163
2,500	0.1165	0.8788	1.4445
2,550	0.1188	0.8960	1.4726
2,600	0.1210	0.9130	1.5007
2,650	0.1233	0.9301	1.5287
2,700	0.1255	0.9471	1.5567
2,750	0.1278	0.9641	1.5846
2,800	0.1300	0.9810	1.6125
2,850	0.1323	0.9980	1.6403
2,900	0.1345	1.0148	1.6680
2,950	0.1368	1.0317	1.6957
3,000	0.1390	1.0485	1.7233
3,050	0.1412	1.0653	1.7509
3,100	0.1434	1.0820	1.7784
3,150	0.1456	1.0987	1.8058
3,200	0.1478	1.1154	1.8332
3,250	0.1500	1.1320	1.8606
3,300	0.1522	1.1486	1.8878
3,350	0.1544	1.1651	1.9150
3,400	0.1566	1.1817	1.9422
3,450	0.1588	1.1981	1.9693
3,500	0.1610	1.2146	1.9963
3,550	0.1632	1.2310	2.0233
3,600	0.1653	1.2474	2.0502
3,650	0.1675	1.2637	2.0771
3,700	0.1697	1.2800	2.1039
3,750	0.1718	1.2963	2.1306
3,800	0.1740	1.3125	2.1573
3,850	0.1761	1.3287	2.1839
3,900	0.1783	1.3449	2.2104
3,950	0.1804	1.3610	2.2369
4,000	0.1825	1.3771	2.2634
4,050	0.1847	1.3931	2.2898
4,100	0.1868	1.4091	2.3161
4,150	0.1889	1.4251	2.3423
4,200	0.1910	1.4410	2.3685
4,250	0.1931	1.4569	2.3947
4,300	0.1952	1.4728	2.4207
4,350	0.1973	1.4886	2.4468

Model:

SPF - Rural Flat and Rolling 2-Lane Undivided Highways

Dispersion (Alpha) = 1.4247E+00

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
4,400	0.1994	1.5044	2.4727
4,450	0.2015	1.5202	2.4986
4,500	0.2036	1.5359	2.5244
4,550	0.2057	1.5516	2.5502
4,600	0.2077	1.5672	2.5759
4,650	0.2098	1.5828	2.6016
4,700	0.2119	1.5984	2.6272
4,750	0.2139	1.6139	2.6527
4,800	0.2160	1.6295	2.6782
4,850	0.2180	1.6449	2.7036
4,900	0.2201	1.6603	2.7290
4,950	0.2221	1.6757	2.7543
5,000	0.2242	1.6911	2.7795
5,050	0.2262	1.7064	2.8047
5,100	0.2282	1.7217	2.8299
5,150	0.2302	1.7370	2.8549
5,200	0.2323	1.7522	2.8799
5,250	0.2343	1.7674	2.9049
5,300	0.2363	1.7825	2.9298
5,350	0.2383	1.7976	2.9546
5,400	0.2403	1.8127	2.9794
5,450	0.2423	1.8277	3.0041
5,500	0.2443	1.8427	3.0287
5,550	0.2462	1.8577	3.0533
5,600	0.2482	1.8726	3.0779
5,650	0.2502	1.8875	3.1024
5,700	0.2522	1.9024	3.1268
5,750	0.2541	1.9172	3.1512
5,800	0.2561	1.9320	3.1755
5,850	0.2580	1.9467	3.1997
5,900	0.2600	1.9615	3.2239
5,950	0.2619	1.9761	3.2481
6,000	0.2639	1.9908	3.2721
6,050	0.2658	2.0054	3.2962
6,100	0.2678	2.0200	3.3201
6,150	0.2697	2.0345	3.3440
6,200	0.2716	2.0491	3.3679
6,250	0.2735	2.0635	3.3917
6,300	0.2754	2.0780	3.4154
6,350	0.2774	2.0924	3.4391
6,400	0.2793	2.1068	3.4627
6,450	0.2812	2.1211	3.4863
6,500	0.2831	2.1354	3.5098
6,550	0.2849	2.1497	3.5333

Model:

SPF - Rural Flat and Rolling 2-Lane Undivided Highways

Dispersion (Alpha) = 1.4247E+00

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
6,600	0.2868	2.1639	3.5567
6,650	0.2887	2.1781	3.5801
6,700	0.2906	2.1923	3.6033
6,750	0.2925	2.2065	3.6266
6,800	0.2943	2.2206	3.6498
6,850	0.2962	2.2346	3.6729
6,900	0.2981	2.2487	3.6960
6,950	0.2999	2.2627	3.7190
7,000	0.3018	2.2766	3.7420
7,050	0.3036	2.2906	3.7649
7,100	0.3055	2.3045	3.7877
7,150	0.3073	2.3184	3.8105
7,200	0.3091	2.3322	3.8333
7,250	0.3110	2.3460	3.8560
7,300	0.3128	2.3598	3.8786
7,350	0.3146	2.3735	3.9012
7,400	0.3164	2.3872	3.9237
7,450	0.3182	2.4009	3.9462
7,500	0.3201	2.4146	3.9687
7,550	0.3219	2.4282	3.9910
7,600	0.3237	2.4418	4.0134
7,650	0.3255	2.4553	4.0356
7,700	0.3272	2.4688	4.0578
7,750	0.3290	2.4823	4.0800
7,800	0.3308	2.4958	4.1021
7,850	0.3326	2.5092	4.1242
7,900	0.3344	2.5226	4.1462
7,950	0.3361	2.5359	4.1681
8,000	0.3379	2.5493	4.1901
8,050	0.3397	2.5626	4.2119
8,100	0.3414	2.5758	4.2337
8,150	0.3432	2.5891	4.2555
8,200	0.3449	2.6023	4.2772
8,250	0.3467	2.6154	4.2988
8,300	0.3484	2.6286	4.3204
8,350	0.3502	2.6417	4.3419
8,400	0.3519	2.6548	4.3634
8,450	0.3536	2.6678	4.3849
8,500	0.3554	2.6808	4.4063
8,550	0.3571	2.6938	4.4276
8,600	0.3588	2.7068	4.4489
8,650	0.3605	2.7197	4.4702
8,700	0.3622	2.7326	4.4914
8,750	0.3639	2.7455	4.5125

Model:

SPF - Rural Flat and Rolling 2-Lane Undivided Highways

Dispersion (Alpha) = 1.4247E+00

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
8,800	0.3656	2.7583	4.5336
8,850	0.3673	2.7711	4.5547
8,900	0.3690	2.7839	4.5757
8,950	0.3707	2.7966	4.5966
9,000	0.3724	2.8093	4.6175
9,050	0.3741	2.8220	4.6383
9,100	0.3757	2.8347	4.6592
9,150	0.3774	2.8473	4.6799
9,200	0.3791	2.8599	4.7006
9,250	0.3808	2.8725	4.7213
9,300	0.3824	2.8850	4.7419
9,350	0.3841	2.8975	4.7624
9,400	0.3857	2.9100	4.7829
9,450	0.3874	2.9224	4.8034
9,500	0.3890	2.9349	4.8238
9,550	0.3907	2.9473	4.8442
9,600	0.3923	2.9596	4.8645
9,650	0.3939	2.9720	4.8848
9,700	0.3956	2.9843	4.9050
9,750	0.3972	2.9965	4.9252
9,800	0.3988	3.0088	4.9453
9,850	0.4004	3.0210	4.9654
9,900	0.4021	3.0332	4.9855
9,950	0.4037	3.0454	5.0055
10,000	0.4053	3.0575	5.0254
10,050	0.4069	3.0696	5.0453
10,100	0.4085	3.0817	5.0652
10,150	0.4101	3.0938	5.0850
10,200	0.4117	3.1058	5.1048
10,250	0.4133	3.1178	5.1245
10,300	0.4149	3.1298	5.1442
10,350	0.4164	3.1417	5.1638
10,400	0.4180	3.1536	5.1834
10,450	0.4196	3.1655	5.2029
10,500	0.4212	3.1774	5.2224
10,550	0.4227	3.1892	5.2419
10,600	0.4243	3.2010	5.2613
10,650	0.4259	3.2128	5.2806
10,700	0.4274	3.2245	5.2999
10,750	0.4290	3.2363	5.3192
10,800	0.4305	3.2480	5.3384
10,850	0.4321	3.2596	5.3576
10,900	0.4336	3.2713	5.3768
10,950	0.4352	3.2829	5.3959

Model:

SPF - Rural Flat and Rolling 2-Lane Undivided Highways

Dispersion (Alpha) = 1.4247E+00

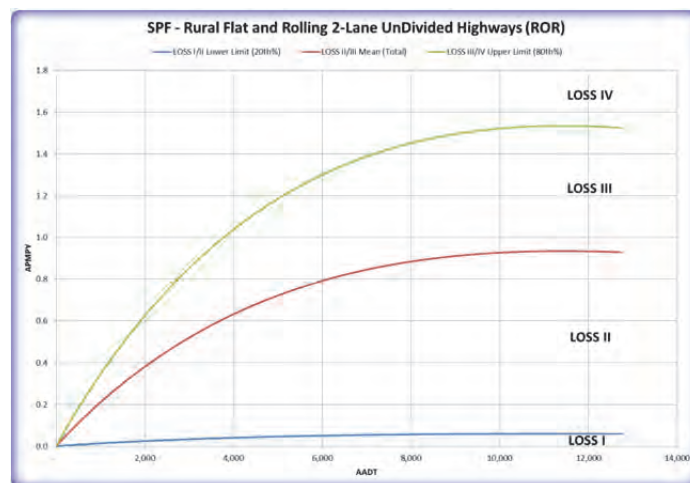
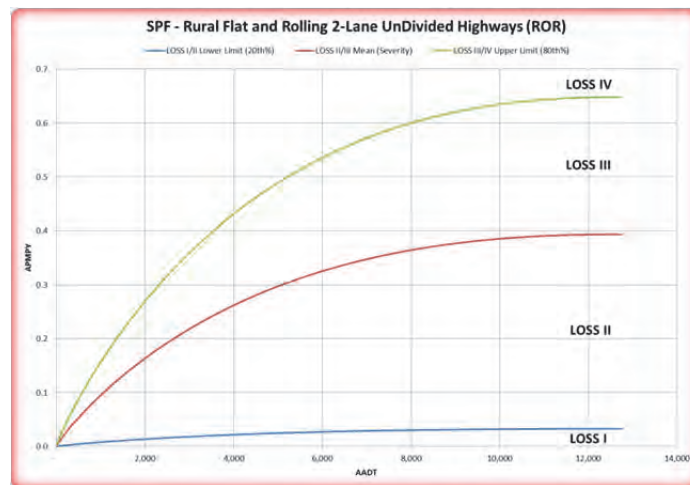
AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
11,000	0.4367	3.2945	5.4149
11,050	0.4382	3.3061	5.4339
11,100	0.4398	3.3176	5.4529
11,150	0.4413	3.3291	5.4718
11,200	0.4428	3.3406	5.4907
11,250	0.4443	3.3521	5.5095
11,300	0.4458	3.3635	5.5283
11,350	0.4474	3.3749	5.5471
11,400	0.4489	3.3863	5.5658
11,450	0.4504	3.3976	5.5845
11,500	0.4519	3.4090	5.6031
11,550	0.4534	3.4203	5.6217
11,600	0.4549	3.4316	5.6402
11,650	0.4564	3.4428	5.6587
11,700	0.4578	3.4540	5.6772
11,750	0.4593	3.4653	5.6956
11,800	0.4608	3.4764	5.7140
11,850	0.4623	3.4876	5.7323
11,900	0.4638	3.4987	5.7506
11,950	0.4652	3.5098	5.7688
12,000	0.4667	3.5209	5.7871
12,050	0.4682	3.5320	5.8052
12,100	0.4696	3.5430	5.8233
12,150	0.4711	3.5540	5.8414
12,200	0.4725	3.5650	5.8595
12,250	0.4740	3.5759	5.8775
12,300	0.4754	3.5869	5.8955
12,350	0.4769	3.5978	5.9134
12,400	0.4783	3.6086	5.9313
12,450	0.4798	3.6195	5.9491
12,500	0.4812	3.6303	5.9669
12,550	0.4826	3.6411	5.9847
12,600	0.4841	3.6519	6.0024
12,650	0.4855	3.6627	6.0201
12,700	0.4869	3.6734	6.0377
12,750	0.4883	3.6841	6.0554

Montana Rural Flat and Rolling 2-Lane Undivided Highways								
Description	0 - 3000 ADT		3000 - 8000 ADT		> 8000 ADT		All Totals	
	Accidents	Percent	Accidents	Percent	Accidents	Percent	Accidents	Percent
Severity								
PDO	6,951	66.96%	2,320	73.14%	470	76.42%	9,741	68.75%
INJ	3,157	30.41%	798	25.16%	140	22.76%	4,095	28.90%
FAT	273	2.63%	54	1.70%	5	0.81%	332	2.34%
Persons Injured	4,585	N/A	1,124	N/A	214	N/A	5,923	N/A
Persons Killed	307	N/A	62	N/A	6	N/A	375	N/A
Number of Vehicles								
Single Vehicle Accidents	9,079	87.46%	2,487	78.40%	388	63.09%	11,954	84.37%
Two Vehicle Accidents	1,217	11.72%	622	19.61%	194	31.54%	2,033	14.35%
Three or more Vehicle Accident	85	0.82%	63	1.99%	33	5.37%	181	1.28%
Unknown Number of Vehicles	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Location								
On Road	5,524	53.21%	1,947	61.38%	427	69.43%	7,898	55.75%
Off Road	3,041	29.29%	671	21.15%	82	13.33%	3,794	26.78%
Off Road Left	1,275	12.28%	242	7.63%	31	5.04%	1,548	10.93%
Off Road Right	1,766	17.01%	429	13.52%	51	8.29%	2,246	15.85%
Off Road at Tee	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Off Road in Median	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Unknown Road Location	1,816	17.49%	554	17.47%	106	17.24%	2,476	17.48%
Accident Type								
Overturning	2,968	28.59%	490	15.45%	53	8.62%	3,511	24.78%
Other Non Collision	337	3.25%	98	3.09%	8	1.30%	443	3.13%
School Age Pedestrians	0	0.00%	0	0.00%	0	0.00%	0	0.00%
All Other Pedestrians	18	0.17%	9	0.28%	0	0.00%	27	0.19%
Broadside	152	1.46%	82	2.59%	21	3.41%	255	1.80%
Head On	135	1.30%	71	2.24%	15	2.44%	221	1.56%
Rear End	396	3.81%	281	8.86%	135	21.95%	812	5.73%
Sideswipe (Same Direction)	191	1.84%	53	1.67%	14	2.28%	258	1.82%
Sideswipe (Opposite Direction)	241	2.32%	95	2.99%	20	3.25%	356	2.51%
Approach Turn	7	0.07%	7	0.22%	4	0.65%	18	0.13%
Overtaking Turn	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Parked Motor Vehicle	29	0.28%	12	0.38%	2	0.33%	43	0.30%
Railway Vehicle	4	0.04%	1	0.03%	0	0.00%	5	0.04%
Bicycle	2	0.02%	1	0.03%	0	0.00%	3	0.02%
Motorized Bicycle	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Domestic Animal	468	4.51%	55	1.73%	5	0.81%	528	3.73%
Wild Animal	2,653	25.56%	1,127	35.53%	229	37.24%	4,009	28.30%
Light or Utility Pole	88	0.85%	46	1.45%	7	1.14%	141	1.00%
Traffic Signal Pole	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Sign	67	0.65%	21	0.66%	3	0.49%	91	0.64%
Bridge Rail	44	0.42%	10	0.32%	3	0.49%	57	0.40%
Guard Rail	472	4.55%	126	3.97%	9	1.46%	607	4.28%
Cable Rail	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Median Barrier	38	0.37%	3	0.09%	4	0.65%	45	0.32%
Bridge Abutment	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Column or Pier	14	0.13%	6	0.19%	14	2.28%	22	0.16%
Culvert or Headwall	52	0.50%	10	0.32%	3	0.49%	65	0.46%
Embankment	897	8.64%	229	7.22%	26	4.23%	1,152	8.13%
Curb	4	0.04%	0	0.00%	0	0.00%	4	0.03%
Delineator Post	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Fence	352	3.39%	89	2.81%	13	2.11%	454	3.20%
Tree	257	2.48%	80	2.52%	9	1.46%	346	2.44%
Large Boulder	45	0.43%	12	0.38%	0	0.00%	57	0.40%
Rocks in Roadway	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Barricade	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Wall or Building	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Crash Cushion	5	0.05%	2	0.06%	1	0.16%	8	0.06%
Mailbox	22	0.21%	13	0.41%	3	0.49%	38	0.27%
Other Fixed Object	204	1.97%	42	1.32%	11	1.79%	257	1.81%
Involving Other Object	87	0.84%	60	1.89%	4	0.65%	151	1.07%
Road Maintenance Equipment	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Unknown Accident Type	132	1.27%	41	1.29%	11	1.79%	184	1.30%
Total Fixed Objects	2,561	24.67%	689	21.72%	94	15.28%	3,344	23.60%
Total Other Objects	87	0.84%	60	1.89%	4	0.65%	151	1.07%

Montana Rural Flat and Rolling 2-Lane Undivided Highways								
Description	0 - 3000 ADT		3000 - 8000 ADT		> 8000 ADT		All Totals	
	Accidents	Percent	Accidents	Percent	Accidents	Percent	Accidents	Percent
Lighting								
Daylight	5,500	52.98%	1,539	48.52%	315	51.22%	7,354	51.91%
Dawn or Dusk	730	7.03%	208	6.56%	47	7.64%	985	6.95%
Dark - Lighted	108	1.04%	58	1.83%	16	2.60%	182	1.28%
Dark - Unlighted	4,018	38.71%	1,359	42.84%	236	38.37%	5,613	39.62%
Unknown Lighting	25	0.24%	8	0.25%	1	0.16%	34	0.24%
Weather								
No Adverse Weather	8,446	81.36%	2,595	81.81%	516	83.90%	11,557	81.57%
Rain	361	3.48%	112	3.53%	24	3.90%	497	3.51%
Snow or Sleet or Hail	1,312	12.64%	404	12.74%	68	11.06%	1,784	12.59%
Fog	115	1.11%	31	0.98%	5	0.81%	151	1.07%
Dust	3	0.03%	0	0.00%	0	0.00%	3	0.02%
Wind	117	1.13%	17	0.54%	2	0.33%	136	0.96%
Unknown Weather	27	0.26%	13	0.41%	0	0.00%	40	0.28%
Road Condition								
Dry Road	7,062	68.03%	2,128	67.09%	418	67.97%	9,608	67.81%
Wet Road	742	7.15%	294	9.27%	68	11.06%	1,104	7.79%
Muddy Road	11	0.11%	2	0.06%	3	0.49%	16	0.11%
Snowy Road	1,078	10.38%	333	10.50%	44	7.15%	1,455	10.27%
Icy Road	1,330	12.81%	393	12.39%	80	13.01%	1,803	12.73%
Slushy Road	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Foreign Material Road	0	0.00%	1	0.03%	0	0.00%	1	0.01%
With Road Treatment	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Dry with Icy Road Treatment	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Wet with Icy Road Treatment	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Snowy with Icy Road Treatment	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Icy with Icy Road Treatment	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Slushy with Icy Road Treatment	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Unknown Road Condition	158	1.52%	21	0.66%	2	0.33%	181	1.28%
Contributing Factor								
No Apparent Contributing Factor	1,768	17.03%	699	22.04%	137	22.28%	2,604	18.38%
Asleep at the Wheel	284	2.74%	65	2.05%	4	0.65%	353	2.49%
Illness	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Distracted by Passenger	2	0.02%	1	0.03%	2	0.33%	5	0.04%
Driver Inexperience	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Driver Fatigue	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Driver Preoccupied	528	5.09%	129	4.07%	34	5.53%	691	4.88%
Driver Unfamiliar with Area	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Driver Emotionally Upset	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Evading Law Enforcement Officer	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Physical Disability	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Unknown Contributing Factor	7,799	75.13%	2,278	71.82%	438	71.22%	10,515	74.22%
Condition of Driver								
No Impairment Suspected	8,646	83.29%	2,724	85.88%	568	92.36%	11,938	84.26%
Alcohol Involved	1,070	10.31%	278	8.76%	37	6.02%	1,385	9.78%
RX Drugs or Medication Involved	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Illegal Drugs Involved	65	0.63%	35	1.10%	1	0.16%	101	0.71%
Alcohol and Drugs Involved	184	1.77%	48	1.51%	5	0.81%	237	1.67%
Driver/Pedestrian Not Observed	52	0.50%	12	0.38%	0	0.00%	64	0.45%
Unknown Condition	364	3.51%	75	2.36%	4	0.65%	443	3.13%
Total Accidents:	10,381	73.27%	3,172	22.39%	615	4.34%	14,168	100.00%

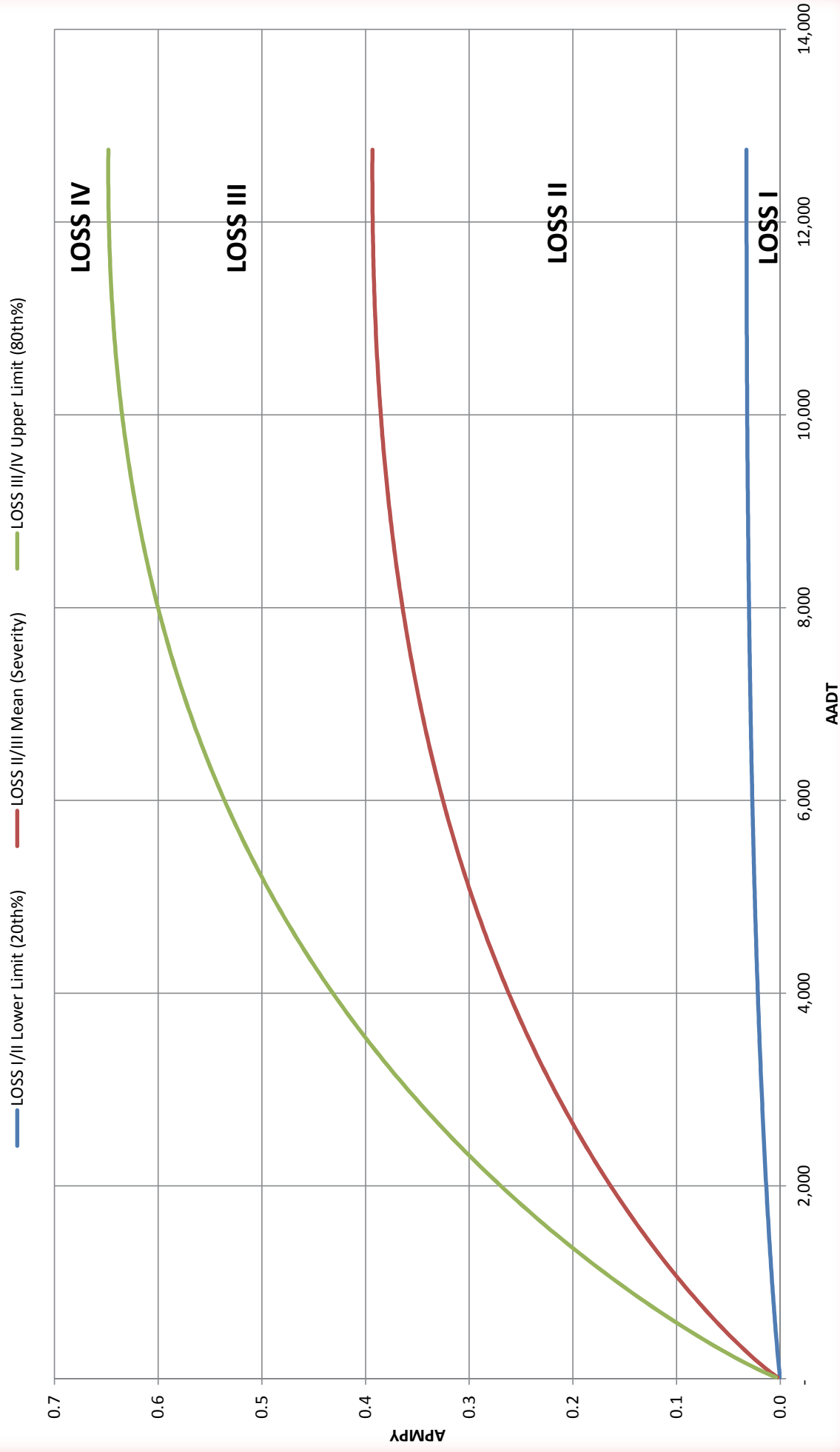


Montana Rural Flat and Rolling 2-Lane UnDivided Highways (ROR)



SPF, LOSS, and Diagnostic Norms

SPF - Rural Flat and Rolling 2-Lane UnDivided Highways (ROR)



Model:

SPF - Rural Flat and Rolling 2-Lane UnDivided Highways (ROR)

Dispersion (Alpha) = 1.8002E+00

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
15	0.0002	0.0025	0.0041
50	0.0006	0.0072	0.0119
100	0.0011	0.0133	0.0219
150	0.0016	0.0190	0.0312
200	0.0020	0.0243	0.0401
250	0.0024	0.0295	0.0487
300	0.0029	0.0346	0.0570
350	0.0033	0.0395	0.0650
400	0.0037	0.0442	0.0729
450	0.0041	0.0489	0.0806
500	0.0044	0.0535	0.0881
550	0.0048	0.0580	0.0955
600	0.0052	0.0624	0.1028
650	0.0055	0.0667	0.1099
700	0.0059	0.0710	0.1169
750	0.0062	0.0752	0.1238
800	0.0066	0.0793	0.1306
850	0.0069	0.0834	0.1373
900	0.0072	0.0874	0.1439
950	0.0076	0.0913	0.1504
1,000	0.0079	0.0952	0.1568
1,050	0.0082	0.0990	0.1632
1,100	0.0085	0.1028	0.1694
1,150	0.0088	0.1066	0.1756
1,200	0.0091	0.1103	0.1816
1,250	0.0094	0.1139	0.1876
1,300	0.0097	0.1175	0.1936
1,350	0.0100	0.1210	0.1994
1,400	0.0103	0.1246	0.2052
1,450	0.0106	0.1280	0.2109
1,500	0.0109	0.1314	0.2165
1,550	0.0112	0.1348	0.2221
1,600	0.0114	0.1382	0.2276
1,650	0.0117	0.1415	0.2331
1,700	0.0120	0.1447	0.2385
1,750	0.0123	0.1480	0.2438
1,800	0.0125	0.1512	0.2490
1,850	0.0128	0.1543	0.2542
1,900	0.0130	0.1574	0.2594
1,950	0.0133	0.1605	0.2644
2,000	0.0135	0.1636	0.2695
2,050	0.0138	0.1666	0.2744
2,100	0.0140	0.1696	0.2793
2,150	0.0143	0.1725	0.2842

Model:

SPF - Rural Flat and Rolling 2-Lane UnDivided Highways (ROR)

Dispersion (Alpha) = 1.8002E+00

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
2,200	0.0145	0.1754	0.2890
2,250	0.0148	0.1783	0.2938
2,300	0.0150	0.1812	0.2985
2,350	0.0152	0.1840	0.3031
2,400	0.0155	0.1868	0.3077
2,450	0.0157	0.1895	0.3123
2,500	0.0159	0.1923	0.3168
2,550	0.0161	0.1950	0.3212
2,600	0.0164	0.1976	0.3256
2,650	0.0166	0.2003	0.3300
2,700	0.0168	0.2029	0.3343
2,750	0.0170	0.2055	0.3385
2,800	0.0172	0.2080	0.3428
2,850	0.0174	0.2106	0.3469
2,900	0.0176	0.2131	0.3510
2,950	0.0178	0.2156	0.3551
3,000	0.0181	0.2180	0.3592
3,050	0.0183	0.2204	0.3632
3,100	0.0185	0.2228	0.3671
3,150	0.0186	0.2252	0.3710
3,200	0.0188	0.2276	0.3749
3,250	0.0190	0.2299	0.3787
3,300	0.0192	0.2322	0.3825
3,350	0.0194	0.2345	0.3863
3,400	0.0196	0.2367	0.3900
3,450	0.0198	0.2389	0.3936
3,500	0.0200	0.2411	0.3973
3,550	0.0201	0.2433	0.4009
3,600	0.0203	0.2455	0.4044
3,650	0.0205	0.2476	0.4079
3,700	0.0207	0.2497	0.4114
3,750	0.0208	0.2518	0.4148
3,800	0.0210	0.2539	0.4182
3,850	0.0212	0.2559	0.4216
3,900	0.0214	0.2579	0.4249
3,950	0.0215	0.2599	0.4282
4,000	0.0217	0.2619	0.4315
4,050	0.0218	0.2639	0.4347
4,100	0.0220	0.2658	0.4379
4,150	0.0222	0.2677	0.4410
4,200	0.0223	0.2696	0.4442
4,250	0.0225	0.2715	0.4472
4,300	0.0226	0.2733	0.4503
4,350	0.0228	0.2752	0.4533

Model:

SPF - Rural Flat and Rolling 2-Lane UnDivided Highways (ROR)

Dispersion (Alpha) = 1.8002E+00

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
4,400	0.0229	0.2770	0.4563
4,450	0.0231	0.2788	0.4592
4,500	0.0232	0.2805	0.4622
4,550	0.0234	0.2823	0.4651
4,600	0.0235	0.2840	0.4679
4,650	0.0237	0.2857	0.4707
4,700	0.0238	0.2874	0.4735
4,750	0.0239	0.2891	0.4763
4,800	0.0241	0.2908	0.4790
4,850	0.0242	0.2924	0.4817
4,900	0.0243	0.2940	0.4844
4,950	0.0245	0.2956	0.4870
5,000	0.0246	0.2972	0.4896
5,050	0.0247	0.2988	0.4922
5,100	0.0249	0.3003	0.4948
5,150	0.0250	0.3019	0.4973
5,200	0.0251	0.3034	0.4998
5,250	0.0252	0.3049	0.5023
5,300	0.0254	0.3064	0.5047
5,350	0.0255	0.3078	0.5071
5,400	0.0256	0.3093	0.5095
5,450	0.0257	0.3107	0.5119
5,500	0.0258	0.3121	0.5142
5,550	0.0260	0.3135	0.5165
5,600	0.0261	0.3149	0.5188
5,650	0.0262	0.3162	0.5210
5,700	0.0263	0.3176	0.5232
5,750	0.0264	0.3189	0.5254
5,800	0.0265	0.3202	0.5276
5,850	0.0266	0.3215	0.5297
5,900	0.0267	0.3228	0.5318
5,950	0.0268	0.3241	0.5339
6,000	0.0269	0.3254	0.5360
6,050	0.0270	0.3266	0.5380
6,100	0.0271	0.3278	0.5401
6,150	0.0272	0.3290	0.5421
6,200	0.0273	0.3302	0.5440
6,250	0.0274	0.3314	0.5460
6,300	0.0275	0.3326	0.5479
6,350	0.0276	0.3337	0.5498
6,400	0.0277	0.3349	0.5517
6,450	0.0278	0.3360	0.5535
6,500	0.0279	0.3371	0.5553
6,550	0.0280	0.3382	0.5571

Model:

SPF - Rural Flat and Rolling 2-Lane UnDivided Highways (ROR)

Dispersion (Alpha) = 1.8002E+00

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
6,600	0.0281	0.3393	0.5589
6,650	0.0282	0.3403	0.5607
6,700	0.0283	0.3414	0.5624
6,750	0.0284	0.3424	0.5641
6,800	0.0284	0.3434	0.5658
6,850	0.0285	0.3445	0.5675
6,900	0.0286	0.3455	0.5691
6,950	0.0287	0.3464	0.5707
7,000	0.0288	0.3474	0.5723
7,050	0.0288	0.3484	0.5739
7,100	0.0289	0.3493	0.5755
7,150	0.0290	0.3503	0.5770
7,200	0.0291	0.3512	0.5785
7,250	0.0292	0.3521	0.5800
7,300	0.0292	0.3530	0.5815
7,350	0.0293	0.3539	0.5830
7,400	0.0294	0.3547	0.5844
7,450	0.0294	0.3556	0.5858
7,500	0.0295	0.3564	0.5872
7,550	0.0296	0.3573	0.5886
7,600	0.0297	0.3581	0.5900
7,650	0.0297	0.3589	0.5913
7,700	0.0298	0.3597	0.5926
7,750	0.0299	0.3605	0.5939
7,800	0.0299	0.3613	0.5952
7,850	0.0300	0.3620	0.5965
7,900	0.0300	0.3628	0.5977
7,950	0.0301	0.3635	0.5989
8,000	0.0302	0.3643	0.6001
8,050	0.0302	0.3650	0.6013
8,100	0.0303	0.3657	0.6025
8,150	0.0303	0.3664	0.6036
8,200	0.0304	0.3671	0.6048
8,250	0.0305	0.3678	0.6059
8,300	0.0305	0.3684	0.6070
8,350	0.0306	0.3691	0.6081
8,400	0.0306	0.3697	0.6091
8,450	0.0307	0.3704	0.6102
8,500	0.0307	0.3710	0.6112
8,550	0.0308	0.3716	0.6122
8,600	0.0308	0.3722	0.6132
8,650	0.0309	0.3728	0.6142
8,700	0.0309	0.3734	0.6151
8,750	0.0310	0.3740	0.6161

Model:

SPF - Rural Flat and Rolling 2-Lane UnDivided Highways (ROR)

Dispersion (Alpha) = 1.8002E+00

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
8,800	0.0310	0.3745	0.6170
8,850	0.0311	0.3751	0.6179
8,900	0.0311	0.3756	0.6188
8,950	0.0311	0.3762	0.6197
9,000	0.0312	0.3767	0.6206
9,050	0.0312	0.3772	0.6214
9,100	0.0313	0.3777	0.6223
9,150	0.0313	0.3782	0.6231
9,200	0.0314	0.3787	0.6239
9,250	0.0314	0.3792	0.6247
9,300	0.0314	0.3796	0.6254
9,350	0.0315	0.3801	0.6262
9,400	0.0315	0.3805	0.6269
9,450	0.0315	0.3810	0.6277
9,500	0.0316	0.3814	0.6284
9,550	0.0316	0.3818	0.6291
9,600	0.0317	0.3823	0.6298
9,650	0.0317	0.3827	0.6304
9,700	0.0317	0.3831	0.6311
9,750	0.0318	0.3835	0.6317
9,800	0.0318	0.3838	0.6324
9,850	0.0318	0.3842	0.6330
9,900	0.0318	0.3846	0.6336
9,950	0.0319	0.3849	0.6342
10,000	0.0319	0.3853	0.6347
10,050	0.0319	0.3856	0.6353
10,100	0.0320	0.3859	0.6358
10,150	0.0320	0.3863	0.6364
10,200	0.0320	0.3866	0.6369
10,250	0.0320	0.3869	0.6374
10,300	0.0321	0.3872	0.6379
10,350	0.0321	0.3875	0.6384
10,400	0.0321	0.3878	0.6388
10,450	0.0321	0.3880	0.6393
10,500	0.0322	0.3883	0.6397
10,550	0.0322	0.3886	0.6402
10,600	0.0322	0.3888	0.6406
10,650	0.0322	0.3891	0.6410
10,700	0.0322	0.3893	0.6414
10,750	0.0323	0.3895	0.6417
10,800	0.0323	0.3898	0.6421
10,850	0.0323	0.3900	0.6425
10,900	0.0323	0.3902	0.6428
10,950	0.0323	0.3904	0.6431

Model:

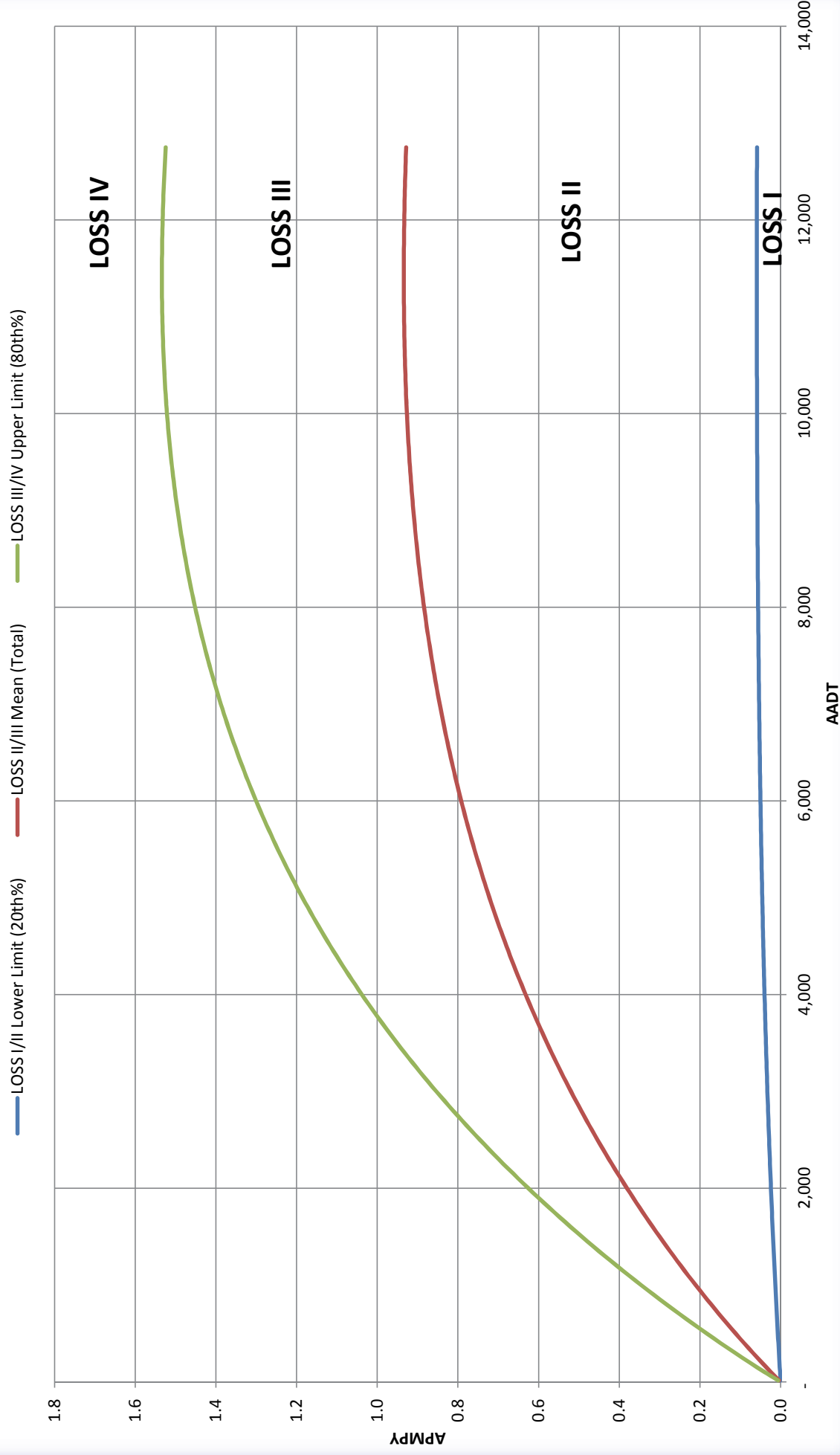
SPF - Rural Flat and Rolling 2-Lane UnDivided Highways (ROR)

Dispersion (Alpha) = 1.8002E+00

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
11,000	0.0323	0.3906	0.6435
11,050	0.0324	0.3908	0.6438
11,100	0.0324	0.3910	0.6441
11,150	0.0324	0.3911	0.6444
11,200	0.0324	0.3913	0.6446
11,250	0.0324	0.3915	0.6449
11,300	0.0324	0.3916	0.6452
11,350	0.0324	0.3918	0.6454
11,400	0.0324	0.3919	0.6456
11,450	0.0325	0.3920	0.6458
11,500	0.0325	0.3922	0.6461
11,550	0.0325	0.3923	0.6463
11,600	0.0325	0.3924	0.6464
11,650	0.0325	0.3925	0.6466
11,700	0.0325	0.3926	0.6468
11,750	0.0325	0.3927	0.6469
11,800	0.0325	0.3928	0.6471
11,850	0.0325	0.3929	0.6472
11,900	0.0325	0.3929	0.6474
11,950	0.0325	0.3930	0.6475
12,000	0.0325	0.3931	0.6476
12,050	0.0326	0.3931	0.6477
12,100	0.0326	0.3932	0.6478
12,150	0.0326	0.3932	0.6478
12,200	0.0326	0.3933	0.6479
12,250	0.0326	0.3933	0.6480
12,300	0.0326	0.3933	0.6480
12,350	0.0326	0.3934	0.6480
12,400	0.0326	0.3934	0.6481
12,450	0.0326	0.3934	0.6481
12,500	0.0326	0.3934	0.6481
12,550	0.0326	0.3934	0.6481
12,600	0.0326	0.3934	0.6481
12,650	0.0326	0.3934	0.6481
12,700	0.0326	0.3934	0.6480
12,750	0.0326	0.3933	0.6480



SPF - Rural Flat and Rolling 2-Lane UnDivided Highways (ROR)



Model:

SPF - Rural Flat and Rolling 2-Lane UnDivided Highways (ROR)

Dispersion (Alpha) = 2.0120E+00

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
15	0.0002	0.0038	0.0062
50	0.0008	0.0122	0.0201
100	0.0015	0.0240	0.0394
150	0.0022	0.0355	0.0582
200	0.0030	0.0468	0.0768
250	0.0037	0.0580	0.0952
300	0.0044	0.0690	0.1132
350	0.0050	0.0798	0.1311
400	0.0057	0.0906	0.1487
450	0.0064	0.1012	0.1662
500	0.0071	0.1117	0.1834
550	0.0077	0.1221	0.2005
600	0.0084	0.1324	0.2173
650	0.0090	0.1425	0.2340
700	0.0096	0.1526	0.2505
750	0.0103	0.1625	0.2669
800	0.0109	0.1724	0.2830
850	0.0115	0.1821	0.2990
900	0.0121	0.1918	0.3149
950	0.0127	0.2013	0.3306
1,000	0.0133	0.2108	0.3461
1,050	0.0139	0.2201	0.3614
1,100	0.0145	0.2294	0.3766
1,150	0.0151	0.2385	0.3917
1,200	0.0157	0.2476	0.4066
1,250	0.0162	0.2566	0.4213
1,300	0.0168	0.2655	0.4359
1,350	0.0173	0.2743	0.4504
1,400	0.0179	0.2830	0.4647
1,450	0.0184	0.2916	0.4788
1,500	0.0190	0.3002	0.4929
1,550	0.0195	0.3086	0.5068
1,600	0.0200	0.3170	0.5205
1,650	0.0206	0.3253	0.5341
1,700	0.0211	0.3335	0.5476
1,750	0.0216	0.3416	0.5609
1,800	0.0221	0.3497	0.5741
1,850	0.0226	0.3576	0.5872
1,900	0.0231	0.3655	0.6001
1,950	0.0236	0.3733	0.6129
2,000	0.0241	0.3810	0.6256
2,050	0.0246	0.3887	0.6381
2,100	0.0250	0.3962	0.6506
2,150	0.0255	0.4037	0.6629

Model:

SPF - Rural Flat and Rolling 2-Lane UnDivided Highways (ROR)

Dispersion (Alpha) = 2.0120E+00

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
2,200	0.0260	0.4111	0.6750
2,250	0.0264	0.4185	0.6871
2,300	0.0269	0.4257	0.6990
2,350	0.0274	0.4329	0.7108
2,400	0.0278	0.4400	0.7225
2,450	0.0283	0.4471	0.7341
2,500	0.0287	0.4540	0.7455
2,550	0.0291	0.4609	0.7568
2,600	0.0296	0.4678	0.7680
2,650	0.0300	0.4745	0.7791
2,700	0.0304	0.4812	0.7901
2,750	0.0308	0.4878	0.8010
2,800	0.0312	0.4944	0.8117
2,850	0.0317	0.5009	0.8224
2,900	0.0321	0.5073	0.8329
2,950	0.0325	0.5136	0.8433
3,000	0.0329	0.5199	0.8536
3,050	0.0333	0.5261	0.8638
3,100	0.0336	0.5322	0.8739
3,150	0.0340	0.5383	0.8839
3,200	0.0344	0.5443	0.8938
3,250	0.0348	0.5503	0.9036
3,300	0.0352	0.5562	0.9132
3,350	0.0355	0.5620	0.9228
3,400	0.0359	0.5678	0.9323
3,450	0.0362	0.5735	0.9416
3,500	0.0366	0.5791	0.9509
3,550	0.0370	0.5847	0.9600
3,600	0.0373	0.5902	0.9691
3,650	0.0376	0.5957	0.9781
3,700	0.0380	0.6011	0.9869
3,750	0.0383	0.6064	0.9957
3,800	0.0387	0.6117	1.0044
3,850	0.0390	0.6169	1.0129
3,900	0.0393	0.6221	1.0214
3,950	0.0396	0.6272	1.0298
4,000	0.0400	0.6322	1.0381
4,050	0.0403	0.6372	1.0463
4,100	0.0406	0.6422	1.0544
4,150	0.0409	0.6470	1.0624
4,200	0.0412	0.6519	1.0703
4,250	0.0415	0.6566	1.0781
4,300	0.0418	0.6613	1.0859
4,350	0.0421	0.6660	1.0935

Model:

SPF - Rural Flat and Rolling 2-Lane UnDivided Highways (ROR)

Dispersion (Alpha) = 2.0120E+00

<u>AADT</u>	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
4,400	0.0424	0.6706	1.1011
4,450	0.0427	0.6752	1.1086
4,500	0.0430	0.6797	1.1160
4,550	0.0432	0.6841	1.1233
4,600	0.0435	0.6885	1.1305
4,650	0.0438	0.6929	1.1376
4,700	0.0441	0.6971	1.1447
4,750	0.0443	0.7014	1.1516
4,800	0.0446	0.7056	1.1585
4,850	0.0449	0.7097	1.1653
4,900	0.0451	0.7138	1.1720
4,950	0.0454	0.7178	1.1787
5,000	0.0456	0.7218	1.1852
5,050	0.0459	0.7258	1.1917
5,100	0.0461	0.7297	1.1981
5,150	0.0464	0.7335	1.2044
5,200	0.0466	0.7373	1.2106
5,250	0.0468	0.7411	1.2168
5,300	0.0471	0.7448	1.2229
5,350	0.0473	0.7484	1.2289
5,400	0.0475	0.7520	1.2348
5,450	0.0478	0.7556	1.2407
5,500	0.0480	0.7591	1.2464
5,550	0.0482	0.7626	1.2522
5,600	0.0484	0.7660	1.2578
5,650	0.0486	0.7694	1.2633
5,700	0.0488	0.7728	1.2688
5,750	0.0490	0.7761	1.2742
5,800	0.0493	0.7793	1.2796
5,850	0.0495	0.7825	1.2849
5,900	0.0497	0.7857	1.2901
5,950	0.0499	0.7888	1.2952
6,000	0.0500	0.7919	1.3002
6,050	0.0502	0.7949	1.3052
6,100	0.0504	0.7979	1.3102
6,150	0.0506	0.8009	1.3150
6,200	0.0508	0.8038	1.3198
6,250	0.0510	0.8067	1.3245
6,300	0.0512	0.8095	1.3292
6,350	0.0513	0.8123	1.3338
6,400	0.0515	0.8151	1.3383
6,450	0.0517	0.8178	1.3428
6,500	0.0519	0.8205	1.3472
6,550	0.0520	0.8231	1.3515

Model:

SPF - Rural Flat and Rolling 2-Lane UnDivided Highways (ROR)

Dispersion (Alpha) = 2.0120E+00

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
6,600	0.0522	0.8257	1.3558
6,650	0.0523	0.8283	1.3600
6,700	0.0525	0.8308	1.3641
6,750	0.0527	0.8333	1.3682
6,800	0.0528	0.8357	1.3722
6,850	0.0530	0.8381	1.3762
6,900	0.0531	0.8405	1.3801
6,950	0.0533	0.8429	1.3839
7,000	0.0534	0.8452	1.3877
7,050	0.0536	0.8474	1.3914
7,100	0.0537	0.8497	1.3951
7,150	0.0538	0.8519	1.3987
7,200	0.0540	0.8540	1.4022
7,250	0.0541	0.8561	1.4057
7,300	0.0542	0.8582	1.4092
7,350	0.0544	0.8603	1.4125
7,400	0.0545	0.8623	1.4159
7,450	0.0546	0.8643	1.4191
7,500	0.0547	0.8662	1.4223
7,550	0.0549	0.8682	1.4255
7,600	0.0550	0.8701	1.4286
7,650	0.0551	0.8719	1.4316
7,700	0.0552	0.8737	1.4346
7,750	0.0553	0.8755	1.4376
7,800	0.0554	0.8773	1.4404
7,850	0.0556	0.8790	1.4433
7,900	0.0557	0.8807	1.4461
7,950	0.0558	0.8824	1.4488
8,000	0.0559	0.8840	1.4515
8,050	0.0560	0.8856	1.4541
8,100	0.0561	0.8872	1.4567
8,150	0.0562	0.8887	1.4592
8,200	0.0563	0.8902	1.4617
8,250	0.0564	0.8917	1.4641
8,300	0.0564	0.8932	1.4665
8,350	0.0565	0.8946	1.4689
8,400	0.0566	0.8960	1.4711
8,450	0.0567	0.8973	1.4734
8,500	0.0568	0.8987	1.4756
8,550	0.0569	0.9000	1.4777
8,600	0.0570	0.9013	1.4798
8,650	0.0570	0.9025	1.4819
8,700	0.0571	0.9037	1.4839
8,750	0.0572	0.9049	1.4858

Model:

SPF - Rural Flat and Rolling 2-Lane UnDivided Highways (ROR)

Dispersion (Alpha) = 2.0120E+00

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
8,800	0.0573	0.9061	1.4878
8,850	0.0573	0.9072	1.4896
8,900	0.0574	0.9084	1.4915
8,950	0.0575	0.9094	1.4932
9,000	0.0575	0.9105	1.4950
9,050	0.0576	0.9115	1.4967
9,100	0.0577	0.9125	1.4983
9,150	0.0577	0.9135	1.5000
9,200	0.0578	0.9145	1.5015
9,250	0.0579	0.9154	1.5031
9,300	0.0579	0.9163	1.5045
9,350	0.0580	0.9172	1.5060
9,400	0.0580	0.9181	1.5074
9,450	0.0581	0.9189	1.5088
9,500	0.0581	0.9197	1.5101
9,550	0.0582	0.9205	1.5114
9,600	0.0582	0.9212	1.5126
9,650	0.0583	0.9220	1.5138
9,700	0.0583	0.9227	1.5150
9,750	0.0584	0.9234	1.5161
9,800	0.0584	0.9240	1.5172
9,850	0.0584	0.9247	1.5183
9,900	0.0585	0.9253	1.5193
9,950	0.0585	0.9259	1.5203
10,000	0.0586	0.9265	1.5212
10,050	0.0586	0.9270	1.5221
10,100	0.0586	0.9276	1.5230
10,150	0.0587	0.9281	1.5238
10,200	0.0587	0.9286	1.5246
10,250	0.0587	0.9290	1.5254
10,300	0.0587	0.9295	1.5261
10,350	0.0588	0.9299	1.5268
10,400	0.0588	0.9303	1.5275
10,450	0.0588	0.9307	1.5281
10,500	0.0588	0.9310	1.5287
10,550	0.0589	0.9314	1.5292
10,600	0.0589	0.9317	1.5298
10,650	0.0589	0.9320	1.5302
10,700	0.0589	0.9323	1.5307
10,750	0.0589	0.9325	1.5311
10,800	0.0590	0.9328	1.5315
10,850	0.0590	0.9330	1.5319
10,900	0.0590	0.9332	1.5322
10,950	0.0590	0.9334	1.5325

Model:

SPF - Rural Flat and Rolling 2-Lane UnDivided Highways (ROR)

Dispersion (Alpha) = 2.0120E+00

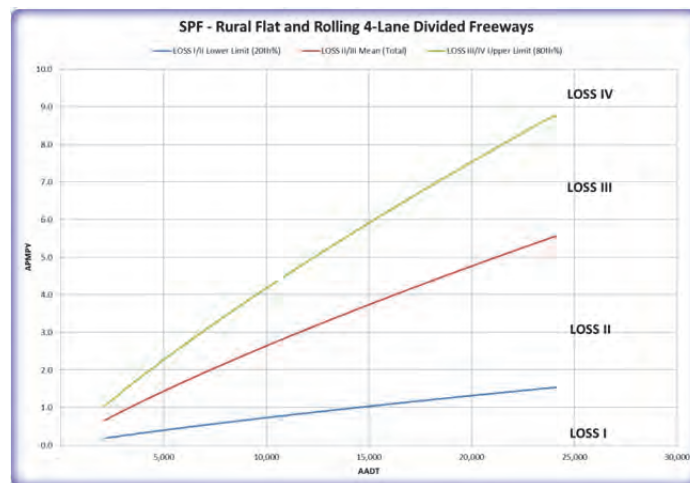
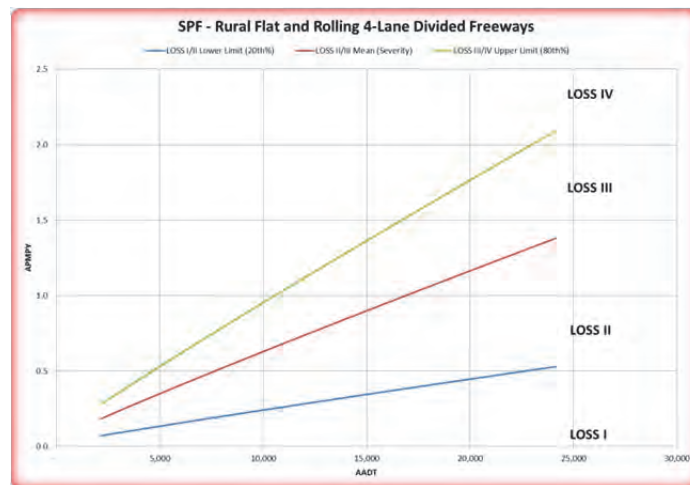
AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
11,000	0.0590	0.9335	1.5328
11,050	0.0590	0.9337	1.5330
11,100	0.0590	0.9338	1.5332
11,150	0.0590	0.9339	1.5334
11,200	0.0590	0.9340	1.5335
11,250	0.0590	0.9340	1.5336
11,300	0.0590	0.9341	1.5337
11,350	0.0590	0.9341	1.5338
11,400	0.0590	0.9341	1.5338
11,450	0.0590	0.9341	1.5338
11,500	0.0590	0.9341	1.5338
11,550	0.0590	0.9341	1.5337
11,600	0.0590	0.9340	1.5336
11,650	0.0590	0.9340	1.5335
11,700	0.0590	0.9339	1.5334
11,750	0.0590	0.9338	1.5332
11,800	0.0590	0.9336	1.5330
11,850	0.0590	0.9335	1.5328
11,900	0.0590	0.9334	1.5325
11,950	0.0590	0.9332	1.5322
12,000	0.0590	0.9330	1.5319
12,050	0.0590	0.9328	1.5316
12,100	0.0589	0.9326	1.5312
12,150	0.0589	0.9324	1.5309
12,200	0.0589	0.9321	1.5305
12,250	0.0589	0.9318	1.5300
12,300	0.0589	0.9316	1.5296
12,350	0.0589	0.9313	1.5291
12,400	0.0588	0.9310	1.5286
12,450	0.0588	0.9306	1.5281
12,500	0.0588	0.9303	1.5275
12,550	0.0588	0.9300	1.5269
12,600	0.0588	0.9296	1.5263
12,650	0.0587	0.9292	1.5257
12,700	0.0587	0.9288	1.5250
12,750	0.0587	0.9284	1.5244

Montana Rural Flat and Rolling 2-Lane Undivided Highways (ROR)								
Description	0 - 2500 ADT		2500 - 5000 ADT		> 5000 ADT		All Totals	
	Accidents	Percent	Accidents	Percent	Accidents	Percent	Accidents	Percent
Severity								
PDO	2,991	54.08%	817	60.70%	399	56.52%	4,207	55.48%
INJ	2,320	41.95%	497	36.92%	279	39.52%	3,096	40.83%
FAT	220	3.98%	32	2.38%	28	3.97%	280	3.69%
Persons Injured	3,296	N/A	684	N/A	382	N/A	4,362	N/A
Persons Killed	245	N/A	38	N/A	35	N/A	318	N/A
Number of Vehicles								
Single Vehicle Accidents	5,158	93.26%	1,195	88.78%	589	83.43%	6,942	91.55%
Two Vehicle Accidents	347	6.27%	139	10.33%	106	15.01%	592	7.81%
Three or more Vehicle Accident	26	0.47%	12	0.89%	11	1.56%	49	0.65%
Unknown Number of Vehicles	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Location								
On Road	1,914	34.60%	466	34.62%	274	38.81%	2,654	35.00%
Off Road	2,672	48.31%	648	48.14%	302	42.78%	3,622	47.76%
Off Road Left	1,106	20.00%	248	18.42%	121	17.14%	1,475	19.45%
Off Road Right	1,566	28.31%	400	29.72%	181	25.64%	2,147	28.31%
Off Road at Tee	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Off Road in Median	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Unknown Road Location	945	17.09%	232	17.24%	130	18.41%	1,307	17.24%
Accident Type								
Overturning	2,775	50.17%	515	38.26%	221	31.30%	3,511	46.30%
Other Non Collision	0	0.00%	0	0.00%	0	0.00%	0	0.00%
School Age Pedestrians	0	0.00%	0	0.00%	0	0.00%	0	0.00%
All Other Pedestrians	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Broadside	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Head On	118	2.13%	57	4.23%	46	6.52%	221	2.91%
Rear End	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Sideswipe (Same Direction)	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Sideswipe (Opposite Direction)	218	3.94%	75	5.57%	63	8.92%	356	4.69%
Approach Turn	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Overtaking Turn	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Parked Motor Vehicle	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Railway Vehicle	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Bicycle	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Motorized Bicycle	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Domestic Animal	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Wild Animal	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Light or Utility Pole	81	1.46%	40	2.97%	20	2.83%	141	1.86%
Traffic Signal Pole	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Sign	59	1.07%	21	1.56%	11	1.56%	91	1.20%
Bridge Rail	42	0.76%	9	0.67%	6	0.85%	57	0.75%
Guard Rail	422	7.63%	130	9.66%	55	7.79%	607	8.00%
Cable Rail	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Median Barrier	34	0.61%	7	0.52%	4	0.57%	45	0.59%
Bridge Abutment	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Column or Pier	14	0.25%	3	0.22%	14	1.98%	22	0.29%
Culvert or Headwall	50	0.90%	10	0.74%	5	0.71%	65	0.86%
Embankment	820	14.83%	222	16.49%	110	15.58%	1,152	15.19%
Curb	4	0.07%	0	0.00%	0	0.00%	4	0.05%
Delineator Post	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Fence	318	5.75%	85	6.32%	51	7.22%	454	5.99%
Tree	244	4.41%	64	4.75%	38	5.38%	346	4.56%
Large Boulder	41	0.74%	12	0.89%	4	0.57%	57	0.75%
Rocks in Roadway	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Barricade	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Wall or Building	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Crash Cushion	5	0.09%	2	0.15%	1	0.14%	8	0.11%
Mailbox	18	0.33%	12	0.89%	8	1.13%	38	0.50%
Other Fixed Object	187	3.38%	42	3.12%	28	3.97%	257	3.39%
Involving Other Object	81	1.46%	40	2.97%	30	4.25%	151	1.99%
Road Maintenance Equipment	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Unknown Accident Type	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Total Fixed Objects	2,339	42.29%	659	48.96%	346	49.01%	3,344	44.10%
Total Other Objects	81	1.46%	40	2.97%	30	4.25%	151	1.99%

Montana Rural Flat and Rolling 2-Lane Undivided Highways (ROR)								
Description	0 - 2500 ADT		2500 - 5000 ADT		> 5000 ADT		All Totals	
	Accidents	Percent	Accidents	Percent	Accidents	Percent	Accidents	Percent
Lighting								
Daylight	3,331	60.22%	751	55.79%	361	51.13%	4,443	58.59%
Dawn or Dusk	283	5.12%	65	4.83%	36	5.10%	384	5.06%
Dark - Lighted	54	0.98%	17	1.26%	20	2.83%	91	1.20%
Dark - Unlighted	1,848	33.41%	511	37.96%	286	40.51%	2,645	34.88%
Unknown Lighting	15	0.27%	2	0.15%	3	0.42%	20	0.26%
Weather								
No Adverse Weather	4,204	76.01%	980	72.81%	506	71.67%	5,690	75.04%
Rain	220	3.98%	48	3.57%	30	4.25%	298	3.93%
Snow or Sleet or Hail	939	16.98%	292	21.69%	146	20.68%	1,377	18.16%
Fog	59	1.07%	12	0.89%	15	2.12%	86	1.13%
Dust	1	0.02%	0	0.00%	0	0.00%	1	0.01%
Wind	89	1.61%	10	0.74%	5	0.71%	104	1.37%
Unknown Weather	19	0.34%	4	0.30%	4	0.57%	27	0.36%
Road Condition								
Dry Road	3,233	58.45%	669	49.70%	351	49.72%	4,253	56.09%
Wet Road	394	7.12%	106	7.88%	63	8.92%	563	7.42%
Muddy Road	8	0.14%	1	0.07%	2	0.28%	11	0.15%
Snowy Road	785	14.19%	243	18.05%	112	15.86%	1,140	15.03%
Icy Road	990	17.90%	311	23.11%	173	24.50%	1,474	19.44%
Slushy Road	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Foreign Material Road	0	0.00%	1	0.07%	0	0.00%	1	0.01%
With Road Treatment	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Dry with Icy Road Treatment	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Wet with Icy Road Treatment	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Snowy with Icy Road Treatment	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Icy with Icy Road Treatment	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Slushy with Icy Road Treatment	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Unknown Road Condition	121	2.19%	15	1.11%	5	0.71%	141	1.86%
Contributing Factor								
No Apparent Contributing Factor	324	5.86%	97	7.21%	51	7.22%	472	6.22%
Asleep at the Wheel	246	4.45%	62	4.61%	24	3.40%	332	4.38%
Illness	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Distracted by Passenger	2	0.04%	0	0.00%	2	0.28%	4	0.05%
Driver Inexperience	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Driver Fatigue	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Driver Preoccupied	396	7.16%	87	6.46%	33	4.67%	516	6.80%
Driver Unfamiliar with Area	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Driver Emotionally Upset	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Evading Law Enforcement Officer	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Physical Disability	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Unknown Contributing Factor	4,563	82.50%	1,100	81.72%	596	84.42%	6,259	82.54%
Condition of Driver								
No Impairment Suspected	4,158	75.18%	1,019	75.71%	525	74.36%	5,702	75.19%
Alcohol Involved	889	16.07%	217	16.12%	120	17.00%	1,226	16.17%
RX Drugs or Medication Involved	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Illegal Drugs Involved	59	1.07%	17	1.26%	14	1.98%	90	1.19%
Alcohol and Drugs Involved	147	2.66%	36	2.67%	26	3.68%	209	2.76%
Driver/Pedestrian Not Observed	33	0.60%	5	0.37%	1	0.14%	39	0.51%
Unknown Condition	245	4.43%	52	3.86%	20	2.83%	317	4.18%
Total Accidents:	5,531	72.94%	1,346	17.75%	706	9.31%	7,583	100.00%

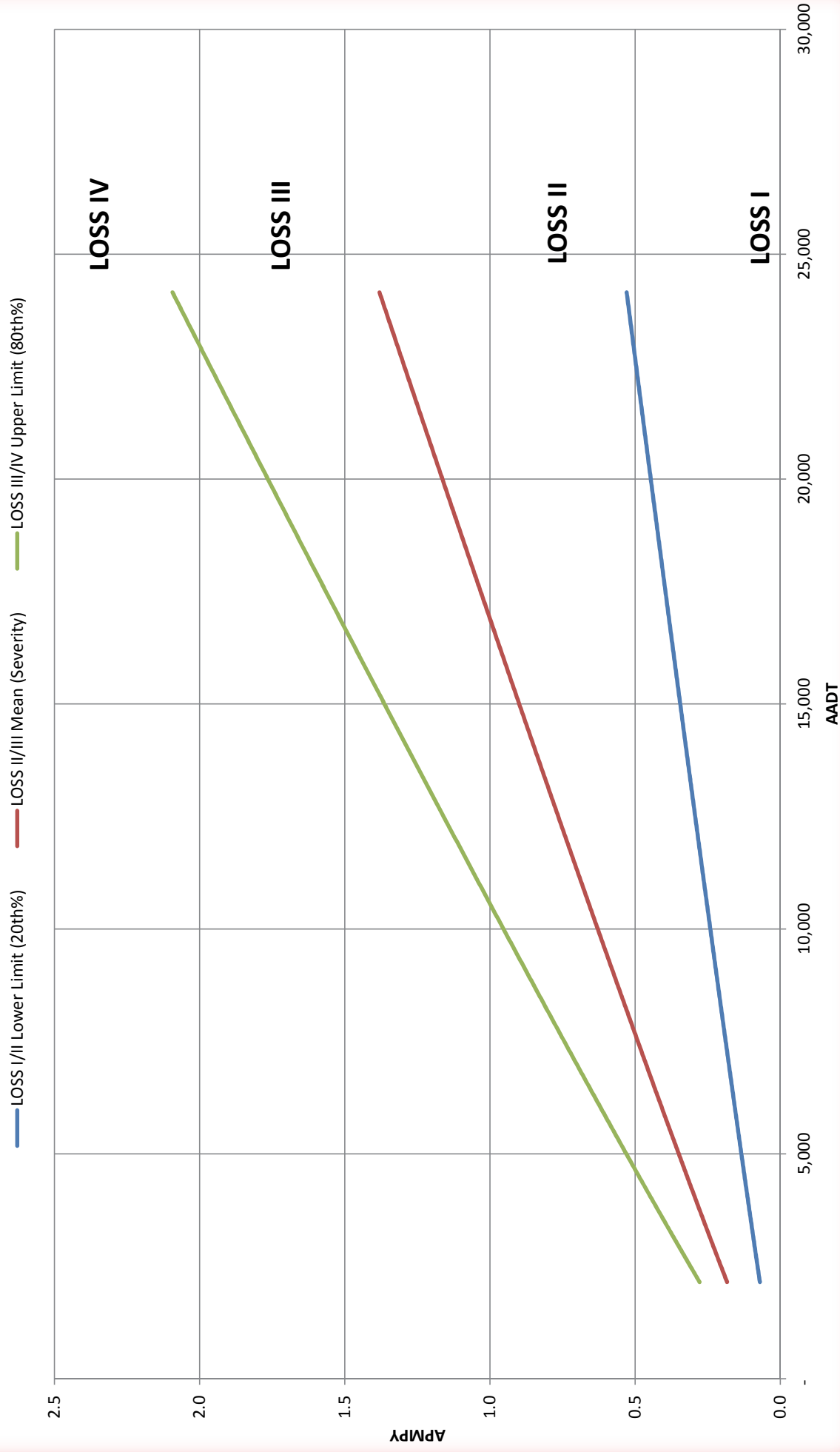


Montana Rural Flat and Rolling 4-Lane Divided Freeways



SPF, LOSS, and Diagnostic Norms

SPF - Rural Flat and Rolling 4-Lane Divided Freeways



Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways

Dispersion (Alpha) = 5.5798E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
2,150	0.0702	0.1833	0.2779
2,200	0.0714	0.1863	0.2825
2,250	0.0725	0.1893	0.2870
2,300	0.0737	0.1923	0.2916
2,350	0.0748	0.1953	0.2961
2,400	0.0760	0.1982	0.3006
2,450	0.0771	0.2012	0.3051
2,500	0.0783	0.2042	0.3097
2,550	0.0794	0.2072	0.3142
2,600	0.0805	0.2102	0.3187
2,650	0.0817	0.2131	0.3232
2,700	0.0828	0.2161	0.3277
2,750	0.0840	0.2191	0.3322
2,800	0.0851	0.2220	0.3367
2,850	0.0862	0.2250	0.3412
2,900	0.0874	0.2279	0.3456
2,950	0.0885	0.2309	0.3501
3,000	0.0896	0.2338	0.3546
3,050	0.0907	0.2368	0.3590
3,100	0.0919	0.2397	0.3635
3,150	0.0930	0.2426	0.3680
3,200	0.0941	0.2456	0.3724
3,250	0.0953	0.2485	0.3769
3,300	0.0964	0.2514	0.3813
3,350	0.0975	0.2544	0.3857
3,400	0.0986	0.2573	0.3902
3,450	0.0997	0.2602	0.3946
3,500	0.1009	0.2631	0.3990
3,550	0.1020	0.2661	0.4035
3,600	0.1031	0.2690	0.4079
3,650	0.1042	0.2719	0.4123
3,700	0.1053	0.2748	0.4167
3,750	0.1064	0.2777	0.4211
3,800	0.1076	0.2806	0.4255
3,850	0.1087	0.2835	0.4299
3,900	0.1098	0.2864	0.4343
3,950	0.1109	0.2893	0.4387
4,000	0.1120	0.2922	0.4431
4,050	0.1131	0.2951	0.4475
4,100	0.1142	0.2980	0.4519
4,150	0.1153	0.3009	0.4563
4,200	0.1164	0.3038	0.4607
4,250	0.1175	0.3067	0.4650
4,300	0.1186	0.3095	0.4694

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways

Dispersion (Alpha) = 5.5798E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
4,350	0.1197	0.3124	0.4738
4,400	0.1208	0.3153	0.4781
4,450	0.1220	0.3182	0.4825
4,500	0.1231	0.3211	0.4869
4,550	0.1242	0.3239	0.4912
4,600	0.1253	0.3268	0.4956
4,650	0.1264	0.3297	0.4999
4,700	0.1275	0.3325	0.5043
4,750	0.1286	0.3354	0.5086
4,800	0.1297	0.3383	0.5130
4,850	0.1307	0.3411	0.5173
4,900	0.1318	0.3440	0.5217
4,950	0.1329	0.3468	0.5260
5,000	0.1340	0.3497	0.5303
5,050	0.1351	0.3526	0.5347
5,100	0.1362	0.3554	0.5390
5,150	0.1373	0.3583	0.5433
5,200	0.1384	0.3611	0.5476
5,250	0.1395	0.3640	0.5519
5,300	0.1406	0.3668	0.5563
5,350	0.1417	0.3697	0.5606
5,400	0.1428	0.3725	0.5649
5,450	0.1439	0.3753	0.5692
5,500	0.1450	0.3782	0.5735
5,550	0.1460	0.3810	0.5778
5,600	0.1471	0.3839	0.5821
5,650	0.1482	0.3867	0.5864
5,700	0.1493	0.3895	0.5907
5,750	0.1504	0.3924	0.5950
5,800	0.1515	0.3952	0.5993
5,850	0.1526	0.3980	0.6036
5,900	0.1536	0.4009	0.6079
5,950	0.1547	0.4037	0.6122
6,000	0.1558	0.4065	0.6165
6,050	0.1569	0.4093	0.6207
6,100	0.1580	0.4122	0.6250
6,150	0.1591	0.4150	0.6293
6,200	0.1601	0.4178	0.6336
6,250	0.1612	0.4206	0.6379
6,300	0.1623	0.4234	0.6421
6,350	0.1634	0.4263	0.6464
6,400	0.1645	0.4291	0.6507
6,450	0.1655	0.4319	0.6549
6,500	0.1666	0.4347	0.6592

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways

Dispersion (Alpha) = 5.5798E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
6,550	0.1677	0.4375	0.6635
6,600	0.1688	0.4403	0.6677
6,650	0.1698	0.4431	0.6720
6,700	0.1709	0.4459	0.6762
6,750	0.1720	0.4487	0.6805
6,800	0.1731	0.4515	0.6847
6,850	0.1741	0.4543	0.6890
6,900	0.1752	0.4571	0.6932
6,950	0.1763	0.4599	0.6975
7,000	0.1774	0.4627	0.7017
7,050	0.1784	0.4655	0.7060
7,100	0.1795	0.4683	0.7102
7,150	0.1806	0.4711	0.7145
7,200	0.1816	0.4739	0.7187
7,250	0.1827	0.4767	0.7229
7,300	0.1838	0.4795	0.7272
7,350	0.1849	0.4823	0.7314
7,400	0.1859	0.4851	0.7356
7,450	0.1870	0.4879	0.7399
7,500	0.1881	0.4907	0.7441
7,550	0.1891	0.4935	0.7483
7,600	0.1902	0.4962	0.7525
7,650	0.1913	0.4990	0.7568
7,700	0.1923	0.5018	0.7610
7,750	0.1934	0.5046	0.7652
7,800	0.1945	0.5074	0.7694
7,850	0.1955	0.5102	0.7736
7,900	0.1966	0.5129	0.7778
7,950	0.1977	0.5157	0.7821
8,000	0.1987	0.5185	0.7863
8,050	0.1998	0.5213	0.7905
8,100	0.2009	0.5240	0.7947
8,150	0.2019	0.5268	0.7989
8,200	0.2030	0.5296	0.8031
8,250	0.2040	0.5324	0.8073
8,300	0.2051	0.5351	0.8115
8,350	0.2062	0.5379	0.8157
8,400	0.2072	0.5407	0.8199
8,450	0.2083	0.5434	0.8241
8,500	0.2093	0.5462	0.8283
8,550	0.2104	0.5490	0.8325
8,600	0.2115	0.5517	0.8367
8,650	0.2125	0.5545	0.8409
8,700	0.2136	0.5572	0.8450

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways

Dispersion (Alpha) = 5.5798E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
8,750	0.2146	0.5600	0.8492
8,800	0.2157	0.5628	0.8534
8,850	0.2168	0.5655	0.8576
8,900	0.2178	0.5683	0.8618
8,950	0.2189	0.5710	0.8660
9,000	0.2199	0.5738	0.8702
9,050	0.2210	0.5766	0.8743
9,100	0.2220	0.5793	0.8785
9,150	0.2231	0.5821	0.8827
9,200	0.2242	0.5848	0.8869
9,250	0.2252	0.5876	0.8910
9,300	0.2263	0.5903	0.8952
9,350	0.2273	0.5931	0.8994
9,400	0.2284	0.5958	0.9035
9,450	0.2294	0.5986	0.9077
9,500	0.2305	0.6013	0.9119
9,550	0.2315	0.6041	0.9160
9,600	0.2326	0.6068	0.9202
9,650	0.2336	0.6096	0.9244
9,700	0.2347	0.6123	0.9285
9,750	0.2357	0.6150	0.9327
9,800	0.2368	0.6178	0.9369
9,850	0.2378	0.6205	0.9410
9,900	0.2389	0.6233	0.9452
9,950	0.2399	0.6260	0.9493
10,000	0.2410	0.6288	0.9535
10,050	0.2420	0.6315	0.9576
10,100	0.2431	0.6342	0.9618
10,150	0.2441	0.6370	0.9659
10,200	0.2452	0.6397	0.9701
10,250	0.2462	0.6424	0.9742
10,300	0.2473	0.6452	0.9784
10,350	0.2483	0.6479	0.9825
10,400	0.2494	0.6506	0.9867
10,450	0.2504	0.6534	0.9908
10,500	0.2515	0.6561	0.9949
10,550	0.2525	0.6588	0.9991
10,600	0.2536	0.6616	1.0032
10,650	0.2546	0.6643	1.0074
10,700	0.2557	0.6670	1.0115
10,750	0.2567	0.6697	1.0156
10,800	0.2577	0.6725	1.0198
10,850	0.2588	0.6752	1.0239
10,900	0.2598	0.6779	1.0280

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways

Dispersion (Alpha) = 5.5798E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
10,950	0.2609	0.6806	1.0322
11,000	0.2619	0.6834	1.0363
11,050	0.2630	0.6861	1.0404
11,100	0.2640	0.6888	1.0446
11,150	0.2650	0.6915	1.0487
11,200	0.2661	0.6942	1.0528
11,250	0.2671	0.6970	1.0569
11,300	0.2682	0.6997	1.0611
11,350	0.2692	0.7024	1.0652
11,400	0.2703	0.7051	1.0693
11,450	0.2713	0.7078	1.0734
11,500	0.2723	0.7106	1.0775
11,550	0.2734	0.7133	1.0817
11,600	0.2744	0.7160	1.0858
11,650	0.2755	0.7187	1.0899
11,700	0.2765	0.7214	1.0940
11,750	0.2775	0.7241	1.0981
11,800	0.2786	0.7268	1.1022
11,850	0.2796	0.7295	1.1063
11,900	0.2807	0.7323	1.1104
11,950	0.2817	0.7350	1.1146
12,000	0.2827	0.7377	1.1187
12,050	0.2838	0.7404	1.1228
12,100	0.2848	0.7431	1.1269
12,150	0.2858	0.7458	1.1310
12,200	0.2869	0.7485	1.1351
12,250	0.2879	0.7512	1.1392
12,300	0.2890	0.7539	1.1433
12,350	0.2900	0.7566	1.1474
12,400	0.2910	0.7593	1.1515
12,450	0.2921	0.7620	1.1556
12,500	0.2931	0.7647	1.1597
12,550	0.2941	0.7674	1.1638
12,600	0.2952	0.7701	1.1679
12,650	0.2962	0.7728	1.1720
12,700	0.2972	0.7755	1.1761
12,750	0.2983	0.7782	1.1802
12,800	0.2993	0.7809	1.1842
12,850	0.3003	0.7836	1.1883
12,900	0.3014	0.7863	1.1924
12,950	0.3024	0.7890	1.1965
13,000	0.3034	0.7917	1.2006
13,050	0.3045	0.7944	1.2047
13,100	0.3055	0.7971	1.2088

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways

Dispersion (Alpha) = 5.5798E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
13,150	0.3065	0.7998	1.2129
13,200	0.3076	0.8025	1.2169
13,250	0.3086	0.8052	1.2210
13,300	0.3096	0.8079	1.2251
13,350	0.3107	0.8106	1.2292
13,400	0.3117	0.8133	1.2333
13,450	0.3127	0.8159	1.2373
13,500	0.3138	0.8186	1.2414
13,550	0.3148	0.8213	1.2455
13,600	0.3158	0.8240	1.2496
13,650	0.3169	0.8267	1.2537
13,700	0.3179	0.8294	1.2577
13,750	0.3189	0.8321	1.2618
13,800	0.3199	0.8348	1.2659
13,850	0.3210	0.8374	1.2700
13,900	0.3220	0.8401	1.2740
13,950	0.3230	0.8428	1.2781
14,000	0.3241	0.8455	1.2822
14,050	0.3251	0.8482	1.2862
14,100	0.3261	0.8509	1.2903
14,150	0.3271	0.8535	1.2944
14,200	0.3282	0.8562	1.2984
14,250	0.3292	0.8589	1.3025
14,300	0.3302	0.8616	1.3066
14,350	0.3313	0.8643	1.3106
14,400	0.3323	0.8669	1.3147
14,450	0.3333	0.8696	1.3187
14,500	0.3343	0.8723	1.3228
14,550	0.3354	0.8750	1.3269
14,600	0.3364	0.8776	1.3309
14,650	0.3374	0.8803	1.3350
14,700	0.3384	0.8830	1.3390
14,750	0.3395	0.8857	1.3431
14,800	0.3405	0.8883	1.3472
14,850	0.3415	0.8910	1.3512
14,900	0.3425	0.8937	1.3553
14,950	0.3436	0.8964	1.3593
15,000	0.3446	0.8990	1.3634
15,050	0.3456	0.9017	1.3674
15,100	0.3466	0.9044	1.3715
15,150	0.3477	0.9071	1.3755
15,200	0.3487	0.9097	1.3796
15,250	0.3497	0.9124	1.3836
15,300	0.3507	0.9151	1.3877

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways

Dispersion (Alpha) = 5.5798E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
15,350	0.3517	0.9177	1.3917
15,400	0.3528	0.9204	1.3958
15,450	0.3538	0.9231	1.3998
15,500	0.3548	0.9257	1.4038
15,550	0.3558	0.9284	1.4079
15,600	0.3569	0.9311	1.4119
15,650	0.3579	0.9337	1.4160
15,700	0.3589	0.9364	1.4200
15,750	0.3599	0.9391	1.4240
15,800	0.3609	0.9417	1.4281
15,850	0.3620	0.9444	1.4321
15,900	0.3630	0.9470	1.4362
15,950	0.3640	0.9497	1.4402
16,000	0.3650	0.9524	1.4442
16,050	0.3660	0.9550	1.4483
16,100	0.3671	0.9577	1.4523
16,150	0.3681	0.9604	1.4563
16,200	0.3691	0.9630	1.4604
16,250	0.3701	0.9657	1.4644
16,300	0.3711	0.9683	1.4684
16,350	0.3722	0.9710	1.4725
16,400	0.3732	0.9736	1.4765
16,450	0.3742	0.9763	1.4805
16,500	0.3752	0.9790	1.4846
16,550	0.3762	0.9816	1.4886
16,600	0.3772	0.9843	1.4926
16,650	0.3783	0.9869	1.4966
16,700	0.3793	0.9896	1.5007
16,750	0.3803	0.9922	1.5047
16,800	0.3813	0.9949	1.5087
16,850	0.3823	0.9975	1.5127
16,900	0.3834	1.0002	1.5168
16,950	0.3844	1.0028	1.5208
17,000	0.3854	1.0055	1.5248
17,050	0.3864	1.0081	1.5288
17,100	0.3874	1.0108	1.5328
17,150	0.3884	1.0134	1.5369
17,200	0.3894	1.0161	1.5409
17,250	0.3905	1.0187	1.5449
17,300	0.3915	1.0214	1.5489
17,350	0.3925	1.0240	1.5529
17,400	0.3935	1.0267	1.5569
17,450	0.3945	1.0293	1.5610
17,500	0.3955	1.0320	1.5650

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways

Dispersion (Alpha) = 5.5798E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
17,550	0.3966	1.0346	1.5690
17,600	0.3976	1.0373	1.5730
17,650	0.3986	1.0399	1.5770
17,700	0.3996	1.0426	1.5810
17,750	0.4006	1.0452	1.5850
17,800	0.4016	1.0479	1.5890
17,850	0.4026	1.0505	1.5931
17,900	0.4036	1.0531	1.5971
17,950	0.4047	1.0558	1.6011
18,000	0.4057	1.0584	1.6051
18,050	0.4067	1.0611	1.6091
18,100	0.4077	1.0637	1.6131
18,150	0.4087	1.0664	1.6171
18,200	0.4097	1.0690	1.6211
18,250	0.4107	1.0716	1.6251
18,300	0.4117	1.0743	1.6291
18,350	0.4128	1.0769	1.6331
18,400	0.4138	1.0796	1.6371
18,450	0.4148	1.0822	1.6411
18,500	0.4158	1.0848	1.6451
18,550	0.4168	1.0875	1.6491
18,600	0.4178	1.0901	1.6531
18,650	0.4188	1.0927	1.6571
18,700	0.4198	1.0954	1.6611
18,750	0.4208	1.0980	1.6651
18,800	0.4219	1.1006	1.6691
18,850	0.4229	1.1033	1.6731
18,900	0.4239	1.1059	1.6771
18,950	0.4249	1.1086	1.6811
19,000	0.4259	1.1112	1.6851
19,050	0.4269	1.1138	1.6891
19,100	0.4279	1.1164	1.6931
19,150	0.4289	1.1191	1.6971
19,200	0.4299	1.1217	1.7010
19,250	0.4309	1.1243	1.7050
19,300	0.4319	1.1270	1.7090
19,350	0.4330	1.1296	1.7130
19,400	0.4340	1.1322	1.7170
19,450	0.4350	1.1349	1.7210
19,500	0.4360	1.1375	1.7250
19,550	0.4370	1.1401	1.7290
19,600	0.4380	1.1428	1.7330
19,650	0.4390	1.1454	1.7369
19,700	0.4400	1.1480	1.7409

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways

Dispersion (Alpha) = 5.5798E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
19,750	0.4410	1.1506	1.7449
19,800	0.4420	1.1533	1.7489
19,850	0.4430	1.1559	1.7529
19,900	0.4440	1.1585	1.7569
19,950	0.4450	1.1611	1.7608
20,000	0.4460	1.1638	1.7648
20,050	0.4471	1.1664	1.7688
20,100	0.4481	1.1690	1.7728
20,150	0.4491	1.1716	1.7768
20,200	0.4501	1.1743	1.7807
20,250	0.4511	1.1769	1.7847
20,300	0.4521	1.1795	1.7887
20,350	0.4531	1.1821	1.7927
20,400	0.4541	1.1848	1.7966
20,450	0.4551	1.1874	1.8006
20,500	0.4561	1.1900	1.8046
20,550	0.4571	1.1926	1.8086
20,600	0.4581	1.1952	1.8125
20,650	0.4591	1.1979	1.8165
20,700	0.4601	1.2005	1.8205
20,750	0.4611	1.2031	1.8245
20,800	0.4621	1.2057	1.8284
20,850	0.4631	1.2083	1.8324
20,900	0.4641	1.2110	1.8364
20,950	0.4651	1.2136	1.8403
21,000	0.4661	1.2162	1.8443
21,050	0.4671	1.2188	1.8483
21,100	0.4681	1.2214	1.8523
21,150	0.4691	1.2240	1.8562
21,200	0.4702	1.2267	1.8602
21,250	0.4712	1.2293	1.8642
21,300	0.4722	1.2319	1.8681
21,350	0.4732	1.2345	1.8721
21,400	0.4742	1.2371	1.8760
21,450	0.4752	1.2397	1.8800
21,500	0.4762	1.2423	1.8840
21,550	0.4772	1.2450	1.8879
21,600	0.4782	1.2476	1.8919
21,650	0.4792	1.2502	1.8959
21,700	0.4802	1.2528	1.8998
21,750	0.4812	1.2554	1.9038
21,800	0.4822	1.2580	1.9077
21,850	0.4832	1.2606	1.9117
21,900	0.4842	1.2632	1.9157

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways

Dispersion (Alpha) = 5.5798E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
21,950	0.4852	1.2659	1.9196
22,000	0.4862	1.2685	1.9236
22,050	0.4872	1.2711	1.9275
22,100	0.4882	1.2737	1.9315
22,150	0.4892	1.2763	1.9354
22,200	0.4902	1.2789	1.9394
22,250	0.4912	1.2815	1.9434
22,300	0.4922	1.2841	1.9473
22,350	0.4932	1.2867	1.9513
22,400	0.4942	1.2893	1.9552
22,450	0.4952	1.2919	1.9592
22,500	0.4962	1.2945	1.9631
22,550	0.4972	1.2971	1.9671
22,600	0.4982	1.2998	1.9710
22,650	0.4992	1.3024	1.9750
22,700	0.5002	1.3050	1.9789
22,750	0.5012	1.3076	1.9829
22,800	0.5022	1.3102	1.9868
22,850	0.5032	1.3128	1.9908
22,900	0.5042	1.3154	1.9947
22,950	0.5052	1.3180	1.9987
23,000	0.5062	1.3206	2.0026
23,050	0.5072	1.3232	2.0066
23,100	0.5081	1.3258	2.0105
23,150	0.5091	1.3284	2.0145
23,200	0.5101	1.3310	2.0184
23,250	0.5111	1.3336	2.0224
23,300	0.5121	1.3362	2.0263
23,350	0.5131	1.3388	2.0302
23,400	0.5141	1.3414	2.0342
23,450	0.5151	1.3440	2.0381
23,500	0.5161	1.3466	2.0421
23,550	0.5171	1.3492	2.0460
23,600	0.5181	1.3518	2.0499
23,650	0.5191	1.3544	2.0539
23,700	0.5201	1.3570	2.0578
23,750	0.5211	1.3596	2.0618
23,800	0.5221	1.3622	2.0657
23,850	0.5231	1.3648	2.0696
23,900	0.5241	1.3674	2.0736
23,950	0.5251	1.3700	2.0775
24,000	0.5261	1.3726	2.0815
24,050	0.5271	1.3752	2.0854
24,100	0.5281	1.3778	2.0893

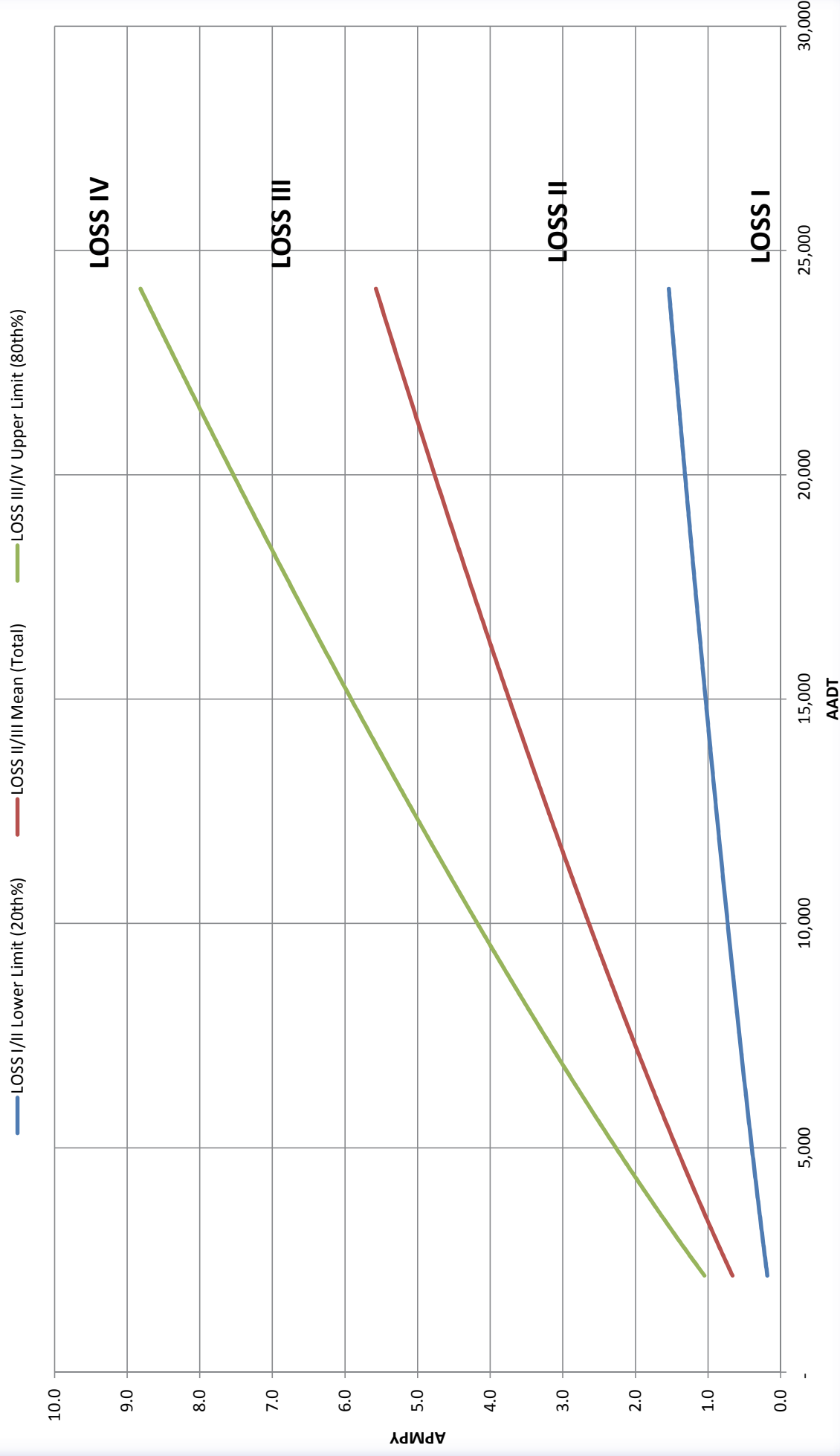
Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways

Dispersion (Alpha) = 5.5798E-01

<u>AADT</u>	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
24,150	0.5291	1.3804	2.0933

SPF - Rural Flat and Rolling 4-Lane Divided Freeways



Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways

Dispersion (Alpha) = 8.2419E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
2,150	0.1833	0.6634	1.0493
2,200	0.1873	0.6778	1.0721
2,250	0.1913	0.6923	1.0949
2,300	0.1953	0.7066	1.1177
2,350	0.1992	0.7209	1.1403
2,400	0.2032	0.7352	1.1629
2,450	0.2071	0.7495	1.1854
2,500	0.2111	0.7637	1.2079
2,550	0.2150	0.7778	1.2303
2,600	0.2189	0.7919	1.2526
2,650	0.2228	0.8060	1.2749
2,700	0.2266	0.8201	1.2971
2,750	0.2305	0.8341	1.3193
2,800	0.2344	0.8481	1.3414
2,850	0.2382	0.8620	1.3634
2,900	0.2421	0.8759	1.3854
2,950	0.2459	0.8898	1.4073
3,000	0.2497	0.9036	1.4292
3,050	0.2535	0.9174	1.4511
3,100	0.2574	0.9312	1.4729
3,150	0.2612	0.9449	1.4946
3,200	0.2649	0.9586	1.5163
3,250	0.2687	0.9723	1.5379
3,300	0.2725	0.9860	1.5595
3,350	0.2763	0.9996	1.5810
3,400	0.2800	1.0132	1.6025
3,450	0.2838	1.0267	1.6240
3,500	0.2875	1.0403	1.6454
3,550	0.2912	1.0538	1.6667
3,600	0.2950	1.0672	1.6881
3,650	0.2987	1.0807	1.7093
3,700	0.3024	1.0941	1.7306
3,750	0.3061	1.1075	1.7517
3,800	0.3098	1.1209	1.7729
3,850	0.3135	1.1342	1.7940
3,900	0.3171	1.1475	1.8151
3,950	0.3208	1.1608	1.8361
4,000	0.3245	1.1741	1.8571
4,050	0.3282	1.1873	1.8780
4,100	0.3318	1.2006	1.8989
4,150	0.3355	1.2138	1.9198
4,200	0.3391	1.2269	1.9406
4,250	0.3427	1.2401	1.9614
4,300	0.3464	1.2532	1.9822

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways

Dispersion (Alpha) = 8.2419E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
4,350	0.3500	1.2663	2.0029
4,400	0.3536	1.2794	2.0236
4,450	0.3572	1.2924	2.0443
4,500	0.3608	1.3055	2.0649
4,550	0.3644	1.3185	2.0855
4,600	0.3680	1.3315	2.1060
4,650	0.3716	1.3445	2.1266
4,700	0.3752	1.3574	2.1470
4,750	0.3787	1.3703	2.1675
4,800	0.3823	1.3833	2.1879
4,850	0.3859	1.3961	2.2083
4,900	0.3894	1.4090	2.2286
4,950	0.3930	1.4219	2.2490
5,000	0.3965	1.4347	2.2693
5,050	0.4001	1.4475	2.2895
5,100	0.4036	1.4603	2.3097
5,150	0.4071	1.4731	2.3299
5,200	0.4106	1.4858	2.3501
5,250	0.4142	1.4985	2.3703
5,300	0.4177	1.5113	2.3904
5,350	0.4212	1.5239	2.4104
5,400	0.4247	1.5366	2.4305
5,450	0.4282	1.5493	2.4505
5,500	0.4317	1.5619	2.4705
5,550	0.4352	1.5745	2.4905
5,600	0.4386	1.5871	2.5104
5,650	0.4421	1.5997	2.5303
5,700	0.4456	1.6123	2.5502
5,750	0.4491	1.6249	2.5701
5,800	0.4525	1.6374	2.5899
5,850	0.4560	1.6499	2.6097
5,900	0.4594	1.6624	2.6295
5,950	0.4629	1.6749	2.6492
6,000	0.4663	1.6874	2.6689
6,050	0.4698	1.6998	2.6886
6,100	0.4732	1.7122	2.7083
6,150	0.4767	1.7247	2.7279
6,200	0.4801	1.7371	2.7475
6,250	0.4835	1.7495	2.7671
6,300	0.4869	1.7618	2.7867
6,350	0.4903	1.7742	2.8062
6,400	0.4937	1.7865	2.8258
6,450	0.4972	1.7988	2.8453
6,500	0.5006	1.8112	2.8647

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways

Dispersion (Alpha) = 8.2419E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
6,550	0.5040	1.8235	2.8842
6,600	0.5073	1.8357	2.9036
6,650	0.5107	1.8480	2.9230
6,700	0.5141	1.8602	2.9424
6,750	0.5175	1.8725	2.9617
6,800	0.5209	1.8847	2.9810
6,850	0.5243	1.8969	3.0003
6,900	0.5276	1.9091	3.0196
6,950	0.5310	1.9213	3.0389
7,000	0.5343	1.9334	3.0581
7,050	0.5377	1.9456	3.0773
7,100	0.5411	1.9577	3.0965
7,150	0.5444	1.9698	3.1157
7,200	0.5478	1.9819	3.1348
7,250	0.5511	1.9940	3.1540
7,300	0.5544	2.0061	3.1731
7,350	0.5578	2.0182	3.1921
7,400	0.5611	2.0302	3.2112
7,450	0.5644	2.0422	3.2302
7,500	0.5677	2.0543	3.2493
7,550	0.5711	2.0663	3.2683
7,600	0.5744	2.0783	3.2872
7,650	0.5777	2.0903	3.3062
7,700	0.5810	2.1022	3.3251
7,750	0.5843	2.1142	3.3440
7,800	0.5876	2.1261	3.3629
7,850	0.5909	2.1381	3.3818
7,900	0.5942	2.1500	3.4006
7,950	0.5975	2.1619	3.4195
8,000	0.6008	2.1738	3.4383
8,050	0.6041	2.1857	3.4571
8,100	0.6073	2.1975	3.4759
8,150	0.6106	2.2094	3.4946
8,200	0.6139	2.2212	3.5133
8,250	0.6172	2.2331	3.5321
8,300	0.6204	2.2449	3.5507
8,350	0.6237	2.2567	3.5694
8,400	0.6269	2.2685	3.5881
8,450	0.6302	2.2803	3.6067
8,500	0.6335	2.2920	3.6253
8,550	0.6367	2.3038	3.6439
8,600	0.6400	2.3155	3.6625
8,650	0.6432	2.3273	3.6811
8,700	0.6464	2.3390	3.6996

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways

Dispersion (Alpha) = 8.2419E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
8,750	0.6497	2.3507	3.7181
8,800	0.6529	2.3624	3.7367
8,850	0.6561	2.3741	3.7551
8,900	0.6594	2.3858	3.7736
8,950	0.6626	2.3974	3.7921
9,000	0.6658	2.4091	3.8105
9,050	0.6690	2.4207	3.8289
9,100	0.6722	2.4324	3.8473
9,150	0.6755	2.4440	3.8657
9,200	0.6787	2.4556	3.8841
9,250	0.6819	2.4672	3.9024
9,300	0.6851	2.4788	3.9207
9,350	0.6883	2.4904	3.9391
9,400	0.6915	2.5019	3.9574
9,450	0.6947	2.5135	3.9756
9,500	0.6979	2.5250	3.9939
9,550	0.7010	2.5366	4.0121
9,600	0.7042	2.5481	4.0304
9,650	0.7074	2.5596	4.0486
9,700	0.7106	2.5711	4.0668
9,750	0.7138	2.5826	4.0849
9,800	0.7169	2.5941	4.1031
9,850	0.7201	2.6056	4.1213
9,900	0.7233	2.6170	4.1394
9,950	0.7264	2.6285	4.1575
10,000	0.7296	2.6399	4.1756
10,050	0.7328	2.6514	4.1937
10,100	0.7359	2.6628	4.2117
10,150	0.7391	2.6742	4.2298
10,200	0.7422	2.6856	4.2478
10,250	0.7454	2.6970	4.2658
10,300	0.7485	2.7084	4.2838
10,350	0.7517	2.7197	4.3018
10,400	0.7548	2.7311	4.3198
10,450	0.7579	2.7424	4.3377
10,500	0.7611	2.7538	4.3557
10,550	0.7642	2.7651	4.3736
10,600	0.7673	2.7764	4.3915
10,650	0.7705	2.7877	4.4094
10,700	0.7736	2.7990	4.4273
10,750	0.7767	2.8103	4.4451
10,800	0.7798	2.8216	4.4630
10,850	0.7829	2.8329	4.4808
10,900	0.7860	2.8441	4.4986

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways

Dispersion (Alpha) = 8.2419E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
10,950	0.7892	2.8554	4.5164
11,000	0.7923	2.8666	4.5342
11,050	0.7954	2.8779	4.5520
11,100	0.7985	2.8891	4.5697
11,150	0.8016	2.9003	4.5875
11,200	0.8047	2.9115	4.6052
11,250	0.8078	2.9227	4.6229
11,300	0.8109	2.9339	4.6406
11,350	0.8139	2.9451	4.6583
11,400	0.8170	2.9563	4.6760
11,450	0.8201	2.9674	4.6936
11,500	0.8232	2.9786	4.7113
11,550	0.8263	2.9897	4.7289
11,600	0.8294	3.0009	4.7465
11,650	0.8324	3.0120	4.7641
11,700	0.8355	3.0231	4.7817
11,750	0.8386	3.0342	4.7992
11,800	0.8416	3.0453	4.8168
11,850	0.8447	3.0564	4.8343
11,900	0.8478	3.0675	4.8519
11,950	0.8508	3.0786	4.8694
12,000	0.8539	3.0896	4.8869
12,050	0.8569	3.1007	4.9044
12,100	0.8600	3.1117	4.9218
12,150	0.8631	3.1228	4.9393
12,200	0.8661	3.1338	4.9568
12,250	0.8691	3.1448	4.9742
12,300	0.8722	3.1558	4.9916
12,350	0.8752	3.1668	5.0090
12,400	0.8783	3.1778	5.0264
12,450	0.8813	3.1888	5.0438
12,500	0.8843	3.1998	5.0611
12,550	0.8874	3.2108	5.0785
12,600	0.8904	3.2217	5.0958
12,650	0.8934	3.2327	5.1132
12,700	0.8965	3.2436	5.1305
12,750	0.8995	3.2546	5.1478
12,800	0.9025	3.2655	5.1651
12,850	0.9055	3.2764	5.1823
12,900	0.9085	3.2873	5.1996
12,950	0.9115	3.2982	5.2168
13,000	0.9146	3.3091	5.2341
13,050	0.9176	3.3200	5.2513
13,100	0.9206	3.3309	5.2685

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways

Dispersion (Alpha) = 8.2419E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
13,150	0.9236	3.3418	5.2857
13,200	0.9266	3.3526	5.3029
13,250	0.9296	3.3635	5.3201
13,300	0.9326	3.3743	5.3372
13,350	0.9356	3.3852	5.3544
13,400	0.9386	3.3960	5.3715
13,450	0.9416	3.4068	5.3886
13,500	0.9446	3.4177	5.4057
13,550	0.9475	3.4285	5.4228
13,600	0.9505	3.4393	5.4399
13,650	0.9535	3.4501	5.4570
13,700	0.9565	3.4608	5.4741
13,750	0.9595	3.4716	5.4911
13,800	0.9624	3.4824	5.5081
13,850	0.9654	3.4932	5.5252
13,900	0.9684	3.5039	5.5422
13,950	0.9714	3.5147	5.5592
14,000	0.9743	3.5254	5.5762
14,050	0.9773	3.5361	5.5931
14,100	0.9803	3.5469	5.6101
14,150	0.9832	3.5576	5.6271
14,200	0.9862	3.5683	5.6440
14,250	0.9891	3.5790	5.6609
14,300	0.9921	3.5897	5.6778
14,350	0.9950	3.6004	5.6947
14,400	0.9980	3.6111	5.7116
14,450	1.0010	3.6217	5.7285
14,500	1.0039	3.6324	5.7454
14,550	1.0068	3.6430	5.7622
14,600	1.0098	3.6537	5.7791
14,650	1.0127	3.6643	5.7959
14,700	1.0157	3.6750	5.8128
14,750	1.0186	3.6856	5.8296
14,800	1.0215	3.6962	5.8464
14,850	1.0245	3.7068	5.8632
14,900	1.0274	3.7175	5.8799
14,950	1.0303	3.7281	5.8967
15,000	1.0333	3.7386	5.9135
15,050	1.0362	3.7492	5.9302
15,100	1.0391	3.7598	5.9469
15,150	1.0420	3.7704	5.9637
15,200	1.0450	3.7809	5.9804
15,250	1.0479	3.7915	5.9971
15,300	1.0508	3.8021	6.0138

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways

Dispersion (Alpha) = 8.2419E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
15,350	1.0537	3.8126	6.0304
15,400	1.0566	3.8231	6.0471
15,450	1.0595	3.8337	6.0638
15,500	1.0624	3.8442	6.0804
15,550	1.0653	3.8547	6.0970
15,600	1.0682	3.8652	6.1137
15,650	1.0711	3.8757	6.1303
15,700	1.0740	3.8862	6.1469
15,750	1.0769	3.8967	6.1635
15,800	1.0798	3.9072	6.1800
15,850	1.0827	3.9177	6.1966
15,900	1.0856	3.9281	6.2132
15,950	1.0885	3.9386	6.2297
16,000	1.0914	3.9490	6.2462
16,050	1.0943	3.9595	6.2628
16,100	1.0972	3.9699	6.2793
16,150	1.1001	3.9804	6.2958
16,200	1.1030	3.9908	6.3123
16,250	1.1058	4.0012	6.3288
16,300	1.1087	4.0116	6.3452
16,350	1.1116	4.0220	6.3617
16,400	1.1145	4.0324	6.3781
16,450	1.1173	4.0428	6.3946
16,500	1.1202	4.0532	6.4110
16,550	1.1231	4.0636	6.4274
16,600	1.1259	4.0740	6.4439
16,650	1.1288	4.0843	6.4603
16,700	1.1317	4.0947	6.4766
16,750	1.1345	4.1051	6.4930
16,800	1.1374	4.1154	6.5094
16,850	1.1403	4.1258	6.5257
16,900	1.1431	4.1361	6.5421
16,950	1.1460	4.1464	6.5584
17,000	1.1488	4.1567	6.5748
17,050	1.1517	4.1671	6.5911
17,100	1.1545	4.1774	6.6074
17,150	1.1574	4.1877	6.6237
17,200	1.1602	4.1980	6.6400
17,250	1.1631	4.2083	6.6563
17,300	1.1659	4.2185	6.6725
17,350	1.1687	4.2288	6.6888
17,400	1.1716	4.2391	6.7050
17,450	1.1744	4.2494	6.7213
17,500	1.1773	4.2596	6.7375

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways

Dispersion (Alpha) = 8.2419E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
17,550	1.1801	4.2699	6.7537
17,600	1.1829	4.2801	6.7699
17,650	1.1857	4.2904	6.7861
17,700	1.1886	4.3006	6.8023
17,750	1.1914	4.3108	6.8185
17,800	1.1942	4.3211	6.8347
17,850	1.1971	4.3313	6.8508
17,900	1.1999	4.3415	6.8670
17,950	1.2027	4.3517	6.8831
18,000	1.2055	4.3619	6.8992
18,050	1.2083	4.3721	6.9154
18,100	1.2111	4.3823	6.9315
18,150	1.2140	4.3924	6.9476
18,200	1.2168	4.4026	6.9637
18,250	1.2196	4.4128	6.9798
18,300	1.2224	4.4230	6.9958
18,350	1.2252	4.4331	7.0119
18,400	1.2280	4.4433	7.0279
18,450	1.2308	4.4534	7.0440
18,500	1.2336	4.4635	7.0600
18,550	1.2364	4.4737	7.0761
18,600	1.2392	4.4838	7.0921
18,650	1.2420	4.4939	7.1081
18,700	1.2448	4.5040	7.1241
18,750	1.2476	4.5141	7.1401
18,800	1.2504	4.5242	7.1560
18,850	1.2532	4.5343	7.1720
18,900	1.2560	4.5444	7.1880
18,950	1.2588	4.5545	7.2039
19,000	1.2615	4.5646	7.2199
19,050	1.2643	4.5747	7.2358
19,100	1.2671	4.5847	7.2517
19,150	1.2699	4.5948	7.2676
19,200	1.2727	4.6049	7.2836
19,250	1.2754	4.6149	7.2995
19,300	1.2782	4.6250	7.3153
19,350	1.2810	4.6350	7.3312
19,400	1.2838	4.6450	7.3471
19,450	1.2865	4.6551	7.3629
19,500	1.2893	4.6651	7.3788
19,550	1.2921	4.6751	7.3946
19,600	1.2948	4.6851	7.4105
19,650	1.2976	4.6951	7.4263
19,700	1.3004	4.7051	7.4421

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways

Dispersion (Alpha) = 8.2419E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
19,750	1.3031	4.7151	7.4579
19,800	1.3059	4.7251	7.4737
19,850	1.3087	4.7351	7.4895
19,900	1.3114	4.7450	7.5053
19,950	1.3142	4.7550	7.5211
20,000	1.3169	4.7650	7.5368
20,050	1.3197	4.7749	7.5526
20,100	1.3224	4.7849	7.5683
20,150	1.3252	4.7948	7.5841
20,200	1.3279	4.8048	7.5998
20,250	1.3307	4.8147	7.6155
20,300	1.3334	4.8247	7.6312
20,350	1.3362	4.8346	7.6469
20,400	1.3389	4.8445	7.6626
20,450	1.3416	4.8544	7.6783
20,500	1.3444	4.8643	7.6940
20,550	1.3471	4.8742	7.7096
20,600	1.3499	4.8841	7.7253
20,650	1.3526	4.8940	7.7410
20,700	1.3553	4.9039	7.7566
20,750	1.3580	4.9138	7.7722
20,800	1.3608	4.9237	7.7878
20,850	1.3635	4.9336	7.8035
20,900	1.3662	4.9434	7.8191
20,950	1.3690	4.9533	7.8347
21,000	1.3717	4.9631	7.8503
21,050	1.3744	4.9730	7.8658
21,100	1.3771	4.9828	7.8814
21,150	1.3798	4.9927	7.8970
21,200	1.3826	5.0025	7.9125
21,250	1.3853	5.0124	7.9281
21,300	1.3880	5.0222	7.9436
21,350	1.3907	5.0320	7.9592
21,400	1.3934	5.0418	7.9747
21,450	1.3961	5.0516	7.9902
21,500	1.3988	5.0614	8.0057
21,550	1.4016	5.0712	8.0212
21,600	1.4043	5.0810	8.0367
21,650	1.4070	5.0908	8.0522
21,700	1.4097	5.1006	8.0676
21,750	1.4124	5.1104	8.0831
21,800	1.4151	5.1201	8.0986
21,850	1.4178	5.1299	8.1140
21,900	1.4205	5.1397	8.1295

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways

Dispersion (Alpha) = 8.2419E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
21,950	1.4232	5.1494	8.1449
22,000	1.4259	5.1592	8.1603
22,050	1.4286	5.1689	8.1757
22,100	1.4312	5.1787	8.1911
22,150	1.4339	5.1884	8.2065
22,200	1.4366	5.1981	8.2219
22,250	1.4393	5.2079	8.2373
22,300	1.4420	5.2176	8.2527
22,350	1.4447	5.2273	8.2681
22,400	1.4474	5.2370	8.2834
22,450	1.4501	5.2467	8.2988
22,500	1.4527	5.2564	8.3141
22,550	1.4554	5.2661	8.3295
22,600	1.4581	5.2758	8.3448
22,650	1.4608	5.2855	8.3601
22,700	1.4634	5.2952	8.3754
22,750	1.4661	5.3048	8.3907
22,800	1.4688	5.3145	8.4060
22,850	1.4715	5.3242	8.4213
22,900	1.4741	5.3338	8.4366
22,950	1.4768	5.3435	8.4519
23,000	1.4795	5.3531	8.4671
23,050	1.4821	5.3628	8.4824
23,100	1.4848	5.3724	8.4976
23,150	1.4875	5.3821	8.5129
23,200	1.4901	5.3917	8.5281
23,250	1.4928	5.4013	8.5433
23,300	1.4954	5.4109	8.5586
23,350	1.4981	5.4206	8.5738
23,400	1.5008	5.4302	8.5890
23,450	1.5034	5.4398	8.6042
23,500	1.5061	5.4494	8.6194
23,550	1.5087	5.4590	8.6345
23,600	1.5114	5.4686	8.6497
23,650	1.5140	5.4782	8.6649
23,700	1.5167	5.4877	8.6800
23,750	1.5193	5.4973	8.6952
23,800	1.5220	5.5069	8.7103
23,850	1.5246	5.5165	8.7255
23,900	1.5273	5.5260	8.7406
23,950	1.5299	5.5356	8.7557
24,000	1.5325	5.5451	8.7708
24,050	1.5352	5.5547	8.7859
24,100	1.5378	5.5642	8.8010

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways

Dispersion (Alpha) = 8.2419E-01

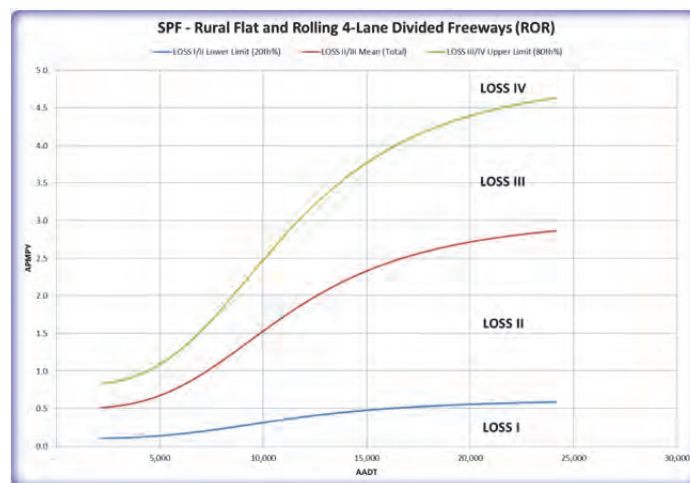
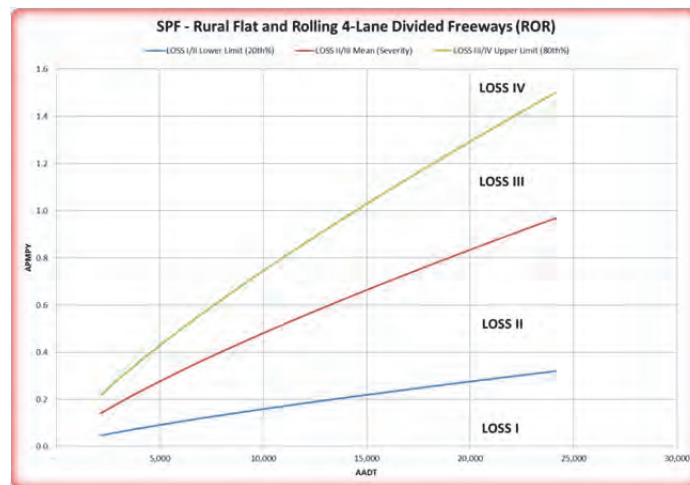
<u>AADT</u>	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
24,150	1.5404	5.5738	8.8161

Montana Rural Flat and Rolling 4-Lane Divided Freeways								
Description	0 - 0 ADT		0 - 12000 ADT		> 12000 ADT		All Totals	
	Accidents	Percent	Accidents	Percent	Accidents	Percent	Accidents	Percent
Severity								
PDO	0		4,756	75.46%	741	75.92%	5,497	75.52%
INJ	0		1,443	22.89%	225	23.05%	1,668	22.92%
FAT	0		104	1.65%	10	1.02%	114	1.57%
Persons Injured	0		2,116	N/A	301	N/A	2,417	N/A
Persons Killed	0		111	N/A	11	N/A	122	N/A
Number of Vehicles								
Single Vehicle Accidents	0		5,650	89.64%	756	77.46%	6,406	88.01%
Two Vehicle Accidents	0		611	9.69%	192	19.67%	803	11.03%
Three or more Vehicle Accident	0		42	0.67%	28	2.87%	70	0.96%
Unknown Number of Vehicles	0		0	0.00%	0	0.00%	0	0.00%
Location								
On Road	0		3,486	55.31%	552	56.56%	4,038	55.47%
Off Road	0		1,627	25.81%	236	24.18%	1,863	25.59%
Off Road Left	0		854	13.55%	121	12.40%	975	13.39%
Off Road Right	0		773	12.26%	115	11.78%	888	12.20%
Off Road at Tee	0		0	0.00%	0	0.00%	0	0.00%
Off Road in Median	0		0	0.00%	0	0.00%	0	0.00%
Unknown Road Location	0		1,190	18.88%	188	19.26%	1,378	18.93%
Accident Type								
Overturning	0		1,537	24.39%	182	18.65%	1,719	23.62%
Other Non Collision	0		325	5.16%	46	4.71%	371	5.10%
School Age Pedestrians	0		0	0.00%	0	0.00%	0	0.00%
All Other Pedestrians	0		6	0.10%	3	0.31%	9	0.12%
Broadside	0		43	0.68%	15	1.54%	58	0.80%
Head On	0		17	0.27%	11	1.13%	28	0.38%
Rear End	0		287	4.55%	96	9.84%	383	5.26%
Sideswipe (Same Direction)	0		199	3.16%	73	7.48%	272	3.74%
Sideswipe (Opposite Direction)	0		17	0.27%	5	0.51%	22	0.30%
Approach Turn	0		1	0.02%	0	0.00%	1	0.01%
Overtaking Turn	0		0	0.00%	0	0.00%	0	0.00%
Parked Motor Vehicle	0		16	0.25%	2	0.20%	18	0.25%
Railway Vehicle	0		0	0.00%	0	0.00%	0	0.00%
Bicycle	0		0	0.00%	0	0.00%	0	0.00%
Motorized Bicycle	0		0	0.00%	0	0.00%	0	0.00%
Domestic Animal	0		22	0.35%	0	0.00%	22	0.30%
Wild Animal	0		2,024	32.11%	181	18.55%	2,205	30.29%
Light or Utility Pole	0		11	0.17%	12	1.23%	23	0.32%
Traffic Signal Pole	0		0	0.00%	0	0.00%	0	0.00%
Sign	0		43	0.68%	8	0.82%	51	0.70%
Bridge Rail	0		98	1.55%	16	1.64%	114	1.57%
Guard Rail	0		551	8.74%	113	11.58%	664	9.12%
Cable Rail	0		0	0.00%	0	0.00%	0	0.00%
Median Barrier	0		225	3.57%	66	6.76%	291	4.00%
Bridge Abutment	0		0	0.00%	0	0.00%	0	0.00%
Column or Pier	0		18	0.29%	0	0.00%	18	0.25%
Culvert or Headwall	0		19	0.30%	1	0.10%	20	0.27%
Embankment	0		284	4.51%	39	4.00%	323	4.44%
Curb	0		1	0.02%	0	0.00%	1	0.01%
Delineator Post	0		0	0.00%	0	0.00%	0	0.00%
Fence	0		282	4.47%	52	5.33%	334	4.59%
Tree	0		24	0.38%	0	0.00%	24	0.33%
Large Boulder	0		7	0.11%	4	0.41%	11	0.15%
Rocks in Roadway	0		0	0.00%	0	0.00%	0	0.00%
Barricade	0		0	0.00%	0	0.00%	0	0.00%
Wall or Building	0		0	0.00%	0	0.00%	0	0.00%
Crash Cushion	0		6	0.10%	0	0.00%	6	0.08%
Mailbox	0		0	0.00%	0	0.00%	0	0.00%
Other Fixed Object	0		90	1.43%	13	1.33%	103	1.42%
Involving Other Object	0		101	1.60%	28	2.87%	129	1.77%
Road Maintenance Equipment	0		0	0.00%	0	0.00%	0	0.00%
Unknown Accident Type	0		49	0.78%	10	1.02%	59	0.81%
Total Fixed Objects	0		1,659	26.32%	324	33.20%	1,983	27.24%
Total Other Objects	0		101	1.60%	28	2.87%	129	1.77%

Montana Rural Flat and Rolling 4-Lane Divided Freeways								
Description	0 - 0 ADT		0 - 12000 ADT		> 12000 ADT		All Totals	
	Accidents	Percent	Accidents	Percent	Accidents	Percent	Accidents	Percent
Lighting								
Daylight	0		3,199	50.75%	571	58.50%	3,770	51.79%
Dawn or Dusk	0		377	5.98%	58	5.94%	435	5.98%
Dark - Lighted	0		91	1.44%	46	4.71%	137	1.88%
Dark - Unlighted	0		2,620	41.57%	301	30.84%	2,921	40.13%
Unknown Lighting	0		16	0.25%	0	0.00%	16	0.22%
Weather								
No Adverse Weather	0		4,688	74.38%	712	72.95%	5,400	74.19%
Rain	0		173	2.74%	25	2.56%	198	2.72%
Snow or Sleet or Hail	0		1,237	19.63%	226	23.16%	1,463	20.10%
Fog	0		62	0.98%	7	0.72%	69	0.95%
Dust	0		3	0.05%	0	0.00%	3	0.04%
Wind	0		122	1.94%	5	0.51%	127	1.74%
Unknown Weather	0		18	0.29%	1	0.10%	19	0.26%
Road Condition								
Dry Road	0		3,589	56.94%	533	54.61%	4,122	56.63%
Wet Road	0		375	5.95%	68	6.97%	443	6.09%
Muddy Road	0		2	0.03%	0	0.00%	2	0.03%
Snowy Road	0		807	12.80%	141	14.45%	948	13.02%
Icy Road	0		1,510	23.96%	230	23.57%	1,740	23.90%
Slushy Road	0		0	0.00%	0	0.00%	0	0.00%
Foreign Material Road	0		0	0.00%	0	0.00%	0	0.00%
With Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Dry with Icy Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Wet with Icy Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Snowy with Icy Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Icy with Icy Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Slushy with Icy Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Unknown Road Condition	0		20	0.32%	4	0.41%	24	0.33%
Contributing Factor								
No Apparent Contributing Factor	0		1,109	17.59%	138	14.14%	1,247	17.13%
Asleep at the Wheel	0		173	2.74%	24	2.46%	197	2.71%
Illness	0		0	0.00%	0	0.00%	0	0.00%
Distracted by Passenger	0		2	0.03%	0	0.00%	2	0.03%
Driver Inexperience	0		0	0.00%	0	0.00%	0	0.00%
Driver Fatigue	0		0	0.00%	0	0.00%	0	0.00%
Driver Preoccupied	0		187	2.97%	41	4.20%	228	3.13%
Driver Unfamiliar with Area	0		0	0.00%	0	0.00%	0	0.00%
Driver Emotionally Upset	0		0	0.00%	0	0.00%	0	0.00%
Evading Law Enforcement Officer	0		0	0.00%	0	0.00%	0	0.00%
Physical Disability	0		0	0.00%	0	0.00%	0	0.00%
Unknown Contributing Factor	0		4,832	76.66%	773	79.20%	5,605	77.00%
Condition of Driver								
No Impairment Suspected	0		5,847	92.77%	880	90.16%	6,727	92.42%
Alcohol Involved	0		220	3.49%	51	5.23%	271	3.72%
RX Drugs or Medication Involved	0		0	0.00%	0	0.00%	0	0.00%
Illegal Drugs Involved	0		49	0.78%	8	0.82%	57	0.78%
Alcohol and Drugs Involved	0		43	0.68%	16	1.64%	59	0.81%
Driver/Pedestrian Not Observed	0		28	0.44%	4	0.41%	32	0.44%
Unknown Condition	0		116	1.84%	17	1.74%	133	1.83%
Total Accidents:	0		6,303	86.59%	976	13.41%	7,279	100.00%

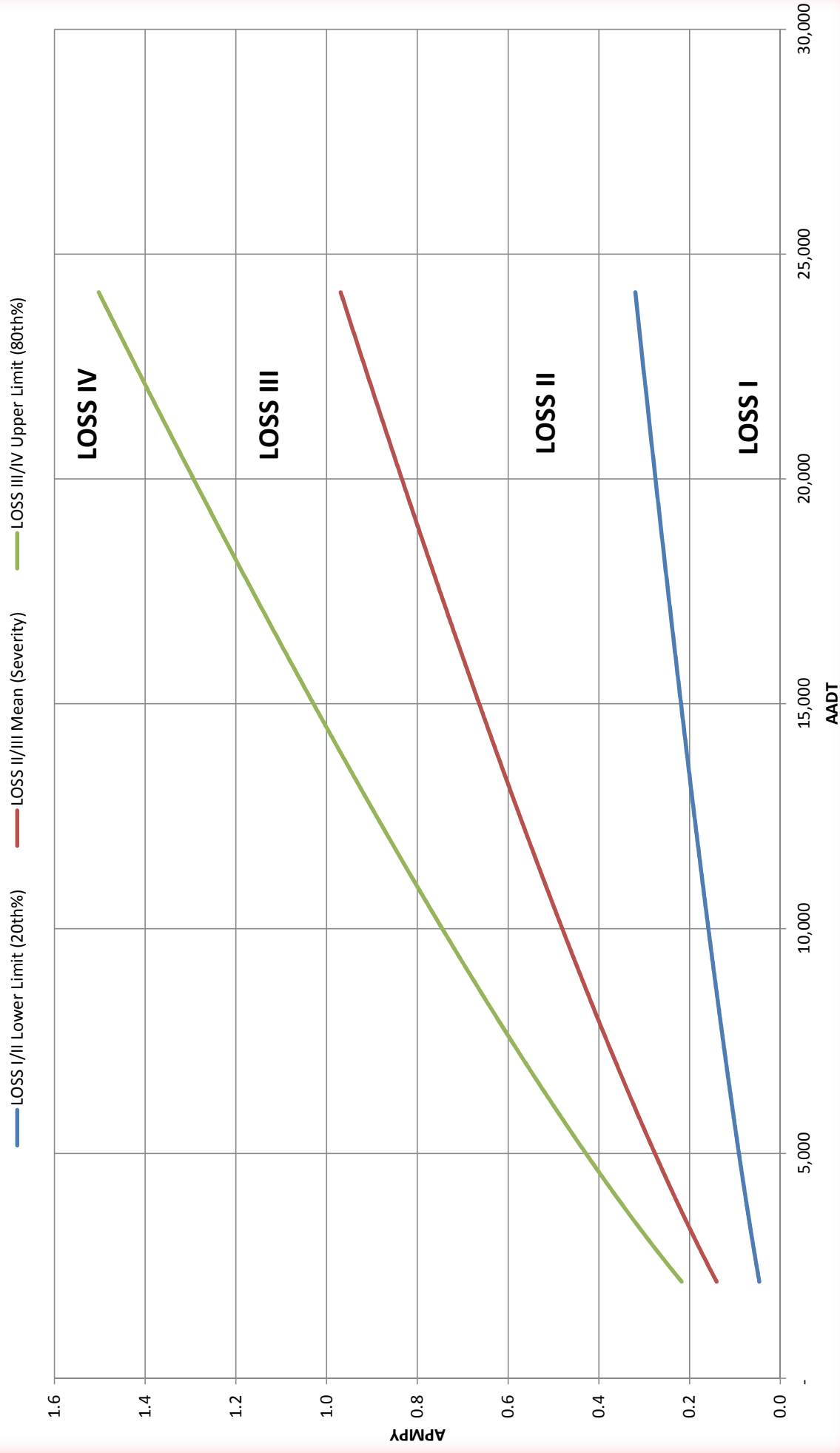


Montana Rural Flat and Rolling 4-Lane Divided Freeways (ROR)



SPF, LOSS, and Diagnostic Norms

SPF - Rural Flat and Rolling 4-Lane Divided Freeways (ROR)



Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways (ROR)

Dispersion (Alpha) = 6.7975E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
2,150	0.0463	0.1403	0.2175
2,200	0.0471	0.1429	0.2216
2,250	0.0480	0.1455	0.2256
2,300	0.0488	0.1481	0.2297
2,350	0.0497	0.1507	0.2337
2,400	0.0505	0.1533	0.2377
2,450	0.0514	0.1559	0.2417
2,500	0.0522	0.1584	0.2456
2,550	0.0531	0.1610	0.2496
2,600	0.0539	0.1635	0.2535
2,650	0.0547	0.1660	0.2574
2,700	0.0556	0.1686	0.2613
2,750	0.0564	0.1711	0.2652
2,800	0.0572	0.1736	0.2691
2,850	0.0580	0.1760	0.2730
2,900	0.0589	0.1785	0.2768
2,950	0.0597	0.1810	0.2806
3,000	0.0605	0.1835	0.2845
3,050	0.0613	0.1859	0.2883
3,100	0.0621	0.1884	0.2921
3,150	0.0629	0.1908	0.2958
3,200	0.0637	0.1932	0.2996
3,250	0.0645	0.1957	0.3034
3,300	0.0653	0.1981	0.3071
3,350	0.0661	0.2005	0.3108
3,400	0.0669	0.2029	0.3146
3,450	0.0677	0.2053	0.3183
3,500	0.0685	0.2076	0.3220
3,550	0.0692	0.2100	0.3256
3,600	0.0700	0.2124	0.3293
3,650	0.0708	0.2148	0.3330
3,700	0.0716	0.2171	0.3366
3,750	0.0724	0.2195	0.3403
3,800	0.0731	0.2218	0.3439
3,850	0.0739	0.2242	0.3475
3,900	0.0747	0.2265	0.3512
3,950	0.0754	0.2288	0.3548
4,000	0.0762	0.2311	0.3584
4,050	0.0770	0.2334	0.3619
4,100	0.0777	0.2357	0.3655
4,150	0.0785	0.2380	0.3691
4,200	0.0792	0.2403	0.3726
4,250	0.0800	0.2426	0.3762
4,300	0.0808	0.2449	0.3797

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways (ROR)

Dispersion (Alpha) = 6.7975E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
4,350	0.0815	0.2472	0.3833
4,400	0.0823	0.2495	0.3868
4,450	0.0830	0.2517	0.3903
4,500	0.0837	0.2540	0.3938
4,550	0.0845	0.2563	0.3973
4,600	0.0852	0.2585	0.4008
4,650	0.0860	0.2608	0.4043
4,700	0.0867	0.2630	0.4078
4,750	0.0875	0.2652	0.4112
4,800	0.0882	0.2675	0.4147
4,850	0.0889	0.2697	0.4182
4,900	0.0897	0.2719	0.4216
4,950	0.0904	0.2741	0.4250
5,000	0.0911	0.2764	0.4285
5,050	0.0918	0.2786	0.4319
5,100	0.0926	0.2808	0.4353
5,150	0.0933	0.2830	0.4387
5,200	0.0940	0.2852	0.4421
5,250	0.0947	0.2873	0.4455
5,300	0.0955	0.2895	0.4489
5,350	0.0962	0.2917	0.4523
5,400	0.0969	0.2939	0.4557
5,450	0.0976	0.2961	0.4591
5,500	0.0983	0.2982	0.4624
5,550	0.0990	0.3004	0.4658
5,600	0.0998	0.3026	0.4691
5,650	0.1005	0.3047	0.4725
5,700	0.1012	0.3069	0.4758
5,750	0.1019	0.3090	0.4791
5,800	0.1026	0.3112	0.4825
5,850	0.1033	0.3133	0.4858
5,900	0.1040	0.3155	0.4891
5,950	0.1047	0.3176	0.4924
6,000	0.1054	0.3197	0.4957
6,050	0.1061	0.3218	0.4990
6,100	0.1068	0.3240	0.5023
6,150	0.1075	0.3261	0.5056
6,200	0.1082	0.3282	0.5089
6,250	0.1089	0.3303	0.5122
6,300	0.1096	0.3324	0.5154
6,350	0.1103	0.3345	0.5187
6,400	0.1110	0.3366	0.5220
6,450	0.1117	0.3387	0.5252
6,500	0.1124	0.3408	0.5285

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways (ROR)

Dispersion (Alpha) = 6.7975E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
6,550	0.1131	0.3429	0.5317
6,600	0.1138	0.3450	0.5349
6,650	0.1144	0.3471	0.5382
6,700	0.1151	0.3492	0.5414
6,750	0.1158	0.3513	0.5446
6,800	0.1165	0.3533	0.5478
6,850	0.1172	0.3554	0.5511
6,900	0.1179	0.3575	0.5543
6,950	0.1185	0.3595	0.5575
7,000	0.1192	0.3616	0.5607
7,050	0.1199	0.3637	0.5639
7,100	0.1206	0.3657	0.5671
7,150	0.1213	0.3678	0.5702
7,200	0.1219	0.3698	0.5734
7,250	0.1226	0.3719	0.5766
7,300	0.1233	0.3739	0.5798
7,350	0.1240	0.3760	0.5829
7,400	0.1246	0.3780	0.5861
7,450	0.1253	0.3800	0.5893
7,500	0.1260	0.3821	0.5924
7,550	0.1266	0.3841	0.5956
7,600	0.1273	0.3861	0.5987
7,650	0.1280	0.3882	0.6018
7,700	0.1287	0.3902	0.6050
7,750	0.1293	0.3922	0.6081
7,800	0.1300	0.3942	0.6112
7,850	0.1306	0.3962	0.6144
7,900	0.1313	0.3983	0.6175
7,950	0.1320	0.4003	0.6206
8,000	0.1326	0.4023	0.6237
8,050	0.1333	0.4043	0.6268
8,100	0.1340	0.4063	0.6299
8,150	0.1346	0.4083	0.6330
8,200	0.1353	0.4103	0.6361
8,250	0.1359	0.4123	0.6392
8,300	0.1366	0.4143	0.6423
8,350	0.1372	0.4162	0.6454
8,400	0.1379	0.4182	0.6485
8,450	0.1386	0.4202	0.6515
8,500	0.1392	0.4222	0.6546
8,550	0.1399	0.4242	0.6577
8,600	0.1405	0.4261	0.6607
8,650	0.1412	0.4281	0.6638
8,700	0.1418	0.4301	0.6669

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways (ROR)

Dispersion (Alpha) = 6.7975E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
8,750	0.1425	0.4321	0.6699
8,800	0.1431	0.4340	0.6730
8,850	0.1438	0.4360	0.6760
8,900	0.1444	0.4380	0.6791
8,950	0.1450	0.4399	0.6821
9,000	0.1457	0.4419	0.6851
9,050	0.1463	0.4438	0.6882
9,100	0.1470	0.4458	0.6912
9,150	0.1476	0.4477	0.6942
9,200	0.1483	0.4497	0.6972
9,250	0.1489	0.4516	0.7003
9,300	0.1496	0.4536	0.7033
9,350	0.1502	0.4555	0.7063
9,400	0.1508	0.4575	0.7093
9,450	0.1515	0.4594	0.7123
9,500	0.1521	0.4613	0.7153
9,550	0.1527	0.4633	0.7183
9,600	0.1534	0.4652	0.7213
9,650	0.1540	0.4671	0.7243
9,700	0.1547	0.4691	0.7273
9,750	0.1553	0.4710	0.7303
9,800	0.1559	0.4729	0.7332
9,850	0.1566	0.4748	0.7362
9,900	0.1572	0.4767	0.7392
9,950	0.1578	0.4787	0.7422
10,000	0.1585	0.4806	0.7451
10,050	0.1591	0.4825	0.7481
10,100	0.1597	0.4844	0.7511
10,150	0.1603	0.4863	0.7540
10,200	0.1610	0.4882	0.7570
10,250	0.1616	0.4901	0.7599
10,300	0.1622	0.4920	0.7629
10,350	0.1629	0.4939	0.7658
10,400	0.1635	0.4958	0.7688
10,450	0.1641	0.4977	0.7717
10,500	0.1647	0.4996	0.7747
10,550	0.1654	0.5015	0.7776
10,600	0.1660	0.5034	0.7805
10,650	0.1666	0.5053	0.7835
10,700	0.1672	0.5072	0.7864
10,750	0.1679	0.5091	0.7893
10,800	0.1685	0.5110	0.7922
10,850	0.1691	0.5128	0.7952
10,900	0.1697	0.5147	0.7981

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways (ROR)

Dispersion (Alpha) = 6.7975E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
10,950	0.1703	0.5166	0.8010
11,000	0.1710	0.5185	0.8039
11,050	0.1716	0.5204	0.8068
11,100	0.1722	0.5222	0.8097
11,150	0.1728	0.5241	0.8126
11,200	0.1734	0.5260	0.8155
11,250	0.1740	0.5278	0.8184
11,300	0.1747	0.5297	0.8213
11,350	0.1753	0.5316	0.8242
11,400	0.1759	0.5334	0.8271
11,450	0.1765	0.5353	0.8300
11,500	0.1771	0.5372	0.8329
11,550	0.1777	0.5390	0.8358
11,600	0.1783	0.5409	0.8386
11,650	0.1789	0.5427	0.8415
11,700	0.1796	0.5446	0.8444
11,750	0.1802	0.5464	0.8473
11,800	0.1808	0.5483	0.8501
11,850	0.1814	0.5501	0.8530
11,900	0.1820	0.5520	0.8559
11,950	0.1826	0.5538	0.8587
12,000	0.1832	0.5557	0.8616
12,050	0.1838	0.5575	0.8644
12,100	0.1844	0.5594	0.8673
12,150	0.1850	0.5612	0.8701
12,200	0.1856	0.5630	0.8730
12,250	0.1862	0.5649	0.8758
12,300	0.1869	0.5667	0.8787
12,350	0.1875	0.5685	0.8815
12,400	0.1881	0.5704	0.8844
12,450	0.1887	0.5722	0.8872
12,500	0.1893	0.5740	0.8900
12,550	0.1899	0.5759	0.8929
12,600	0.1905	0.5777	0.8957
12,650	0.1911	0.5795	0.8985
12,700	0.1917	0.5813	0.9014
12,750	0.1923	0.5832	0.9042
12,800	0.1929	0.5850	0.9070
12,850	0.1935	0.5868	0.9098
12,900	0.1941	0.5886	0.9126
12,950	0.1947	0.5904	0.9154
13,000	0.1953	0.5922	0.9183
13,050	0.1959	0.5940	0.9211
13,100	0.1965	0.5959	0.9239

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways (ROR)

Dispersion (Alpha) = 6.7975E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
13,150	0.1971	0.5977	0.9267
13,200	0.1977	0.5995	0.9295
13,250	0.1983	0.6013	0.9323
13,300	0.1988	0.6031	0.9351
13,350	0.1994	0.6049	0.9379
13,400	0.2000	0.6067	0.9407
13,450	0.2006	0.6085	0.9435
13,500	0.2012	0.6103	0.9462
13,550	0.2018	0.6121	0.9490
13,600	0.2024	0.6139	0.9518
13,650	0.2030	0.6157	0.9546
13,700	0.2036	0.6175	0.9574
13,750	0.2042	0.6193	0.9602
13,800	0.2048	0.6211	0.9629
13,850	0.2054	0.6228	0.9657
13,900	0.2060	0.6246	0.9685
13,950	0.2065	0.6264	0.9713
14,000	0.2071	0.6282	0.9740
14,050	0.2077	0.6300	0.9768
14,100	0.2083	0.6318	0.9796
14,150	0.2089	0.6336	0.9823
14,200	0.2095	0.6353	0.9851
14,250	0.2101	0.6371	0.9878
14,300	0.2107	0.6389	0.9906
14,350	0.2112	0.6407	0.9933
14,400	0.2118	0.6424	0.9961
14,450	0.2124	0.6442	0.9989
14,500	0.2130	0.6460	1.0016
14,550	0.2136	0.6478	1.0043
14,600	0.2142	0.6495	1.0071
14,650	0.2147	0.6513	1.0098
14,700	0.2153	0.6531	1.0126
14,750	0.2159	0.6548	1.0153
14,800	0.2165	0.6566	1.0180
14,850	0.2171	0.6584	1.0208
14,900	0.2177	0.6601	1.0235
14,950	0.2182	0.6619	1.0262
15,000	0.2188	0.6636	1.0290
15,050	0.2194	0.6654	1.0317
15,100	0.2200	0.6672	1.0344
15,150	0.2206	0.6689	1.0372
15,200	0.2211	0.6707	1.0399
15,250	0.2217	0.6724	1.0426
15,300	0.2223	0.6742	1.0453

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways (ROR)

Dispersion (Alpha) = 6.7975E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
15,350	0.2229	0.6759	1.0480
15,400	0.2234	0.6777	1.0507
15,450	0.2240	0.6794	1.0535
15,500	0.2246	0.6812	1.0562
15,550	0.2252	0.6829	1.0589
15,600	0.2257	0.6847	1.0616
15,650	0.2263	0.6864	1.0643
15,700	0.2269	0.6882	1.0670
15,750	0.2275	0.6899	1.0697
15,800	0.2280	0.6916	1.0724
15,850	0.2286	0.6934	1.0751
15,900	0.2292	0.6951	1.0778
15,950	0.2298	0.6969	1.0805
16,000	0.2303	0.6986	1.0832
16,050	0.2309	0.7003	1.0859
16,100	0.2315	0.7021	1.0885
16,150	0.2321	0.7038	1.0912
16,200	0.2326	0.7055	1.0939
16,250	0.2332	0.7073	1.0966
16,300	0.2338	0.7090	1.0993
16,350	0.2343	0.7107	1.1020
16,400	0.2349	0.7124	1.1046
16,450	0.2355	0.7142	1.1073
16,500	0.2360	0.7159	1.1100
16,550	0.2366	0.7176	1.1127
16,600	0.2372	0.7193	1.1153
16,650	0.2377	0.7211	1.1180
16,700	0.2383	0.7228	1.1207
16,750	0.2389	0.7245	1.1233
16,800	0.2394	0.7262	1.1260
16,850	0.2400	0.7279	1.1287
16,900	0.2406	0.7297	1.1313
16,950	0.2411	0.7314	1.1340
17,000	0.2417	0.7331	1.1367
17,050	0.2423	0.7348	1.1393
17,100	0.2428	0.7365	1.1420
17,150	0.2434	0.7382	1.1446
17,200	0.2440	0.7399	1.1473
17,250	0.2445	0.7416	1.1499
17,300	0.2451	0.7434	1.1526
17,350	0.2457	0.7451	1.1552
17,400	0.2462	0.7468	1.1579
17,450	0.2468	0.7485	1.1605
17,500	0.2473	0.7502	1.1631

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways (ROR)

Dispersion (Alpha) = 6.7975E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
17,550	0.2479	0.7519	1.1658
17,600	0.2485	0.7536	1.1684
17,650	0.2490	0.7553	1.1711
17,700	0.2496	0.7570	1.1737
17,750	0.2502	0.7587	1.1763
17,800	0.2507	0.7604	1.1790
17,850	0.2513	0.7621	1.1816
17,900	0.2518	0.7638	1.1842
17,950	0.2524	0.7655	1.1869
18,000	0.2529	0.7672	1.1895
18,050	0.2535	0.7689	1.1921
18,100	0.2541	0.7706	1.1947
18,150	0.2546	0.7722	1.1974
18,200	0.2552	0.7739	1.2000
18,250	0.2557	0.7756	1.2026
18,300	0.2563	0.7773	1.2052
18,350	0.2568	0.7790	1.2078
18,400	0.2574	0.7807	1.2104
18,450	0.2580	0.7824	1.2131
18,500	0.2585	0.7841	1.2157
18,550	0.2591	0.7857	1.2183
18,600	0.2596	0.7874	1.2209
18,650	0.2602	0.7891	1.2235
18,700	0.2607	0.7908	1.2261
18,750	0.2613	0.7925	1.2287
18,800	0.2618	0.7941	1.2313
18,850	0.2624	0.7958	1.2339
18,900	0.2629	0.7975	1.2365
18,950	0.2635	0.7992	1.2391
19,000	0.2641	0.8008	1.2417
19,050	0.2646	0.8025	1.2443
19,100	0.2652	0.8042	1.2469
19,150	0.2657	0.8059	1.2495
19,200	0.2663	0.8075	1.2521
19,250	0.2668	0.8092	1.2547
19,300	0.2674	0.8109	1.2573
19,350	0.2679	0.8126	1.2599
19,400	0.2685	0.8142	1.2624
19,450	0.2690	0.8159	1.2650
19,500	0.2696	0.8176	1.2676
19,550	0.2701	0.8192	1.2702
19,600	0.2707	0.8209	1.2728
19,650	0.2712	0.8225	1.2753
19,700	0.2718	0.8242	1.2779

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways (ROR)

Dispersion (Alpha) = 6.7975E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
19,750	0.2723	0.8259	1.2805
19,800	0.2728	0.8275	1.2831
19,850	0.2734	0.8292	1.2857
19,900	0.2739	0.8308	1.2882
19,950	0.2745	0.8325	1.2908
20,000	0.2750	0.8342	1.2934
20,050	0.2756	0.8358	1.2959
20,100	0.2761	0.8375	1.2985
20,150	0.2767	0.8391	1.3011
20,200	0.2772	0.8408	1.3036
20,250	0.2778	0.8424	1.3062
20,300	0.2783	0.8441	1.3088
20,350	0.2789	0.8457	1.3113
20,400	0.2794	0.8474	1.3139
20,450	0.2799	0.8490	1.3164
20,500	0.2805	0.8507	1.3190
20,550	0.2810	0.8523	1.3215
20,600	0.2816	0.8540	1.3241
20,650	0.2821	0.8556	1.3266
20,700	0.2827	0.8573	1.3292
20,750	0.2832	0.8589	1.3318
20,800	0.2837	0.8606	1.3343
20,850	0.2843	0.8622	1.3368
20,900	0.2848	0.8639	1.3394
20,950	0.2854	0.8655	1.3419
21,000	0.2859	0.8671	1.3445
21,050	0.2864	0.8688	1.3470
21,100	0.2870	0.8704	1.3496
21,150	0.2875	0.8720	1.3521
21,200	0.2881	0.8737	1.3546
21,250	0.2886	0.8753	1.3572
21,300	0.2891	0.8770	1.3597
21,350	0.2897	0.8786	1.3623
21,400	0.2902	0.8802	1.3648
21,450	0.2908	0.8819	1.3673
21,500	0.2913	0.8835	1.3698
21,550	0.2918	0.8851	1.3724
21,600	0.2924	0.8868	1.3749
21,650	0.2929	0.8884	1.3774
21,700	0.2935	0.8900	1.3800
21,750	0.2940	0.8916	1.3825
21,800	0.2945	0.8933	1.3850
21,850	0.2951	0.8949	1.3875
21,900	0.2956	0.8965	1.3901

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways (ROR)

Dispersion (Alpha) = 6.7975E-01

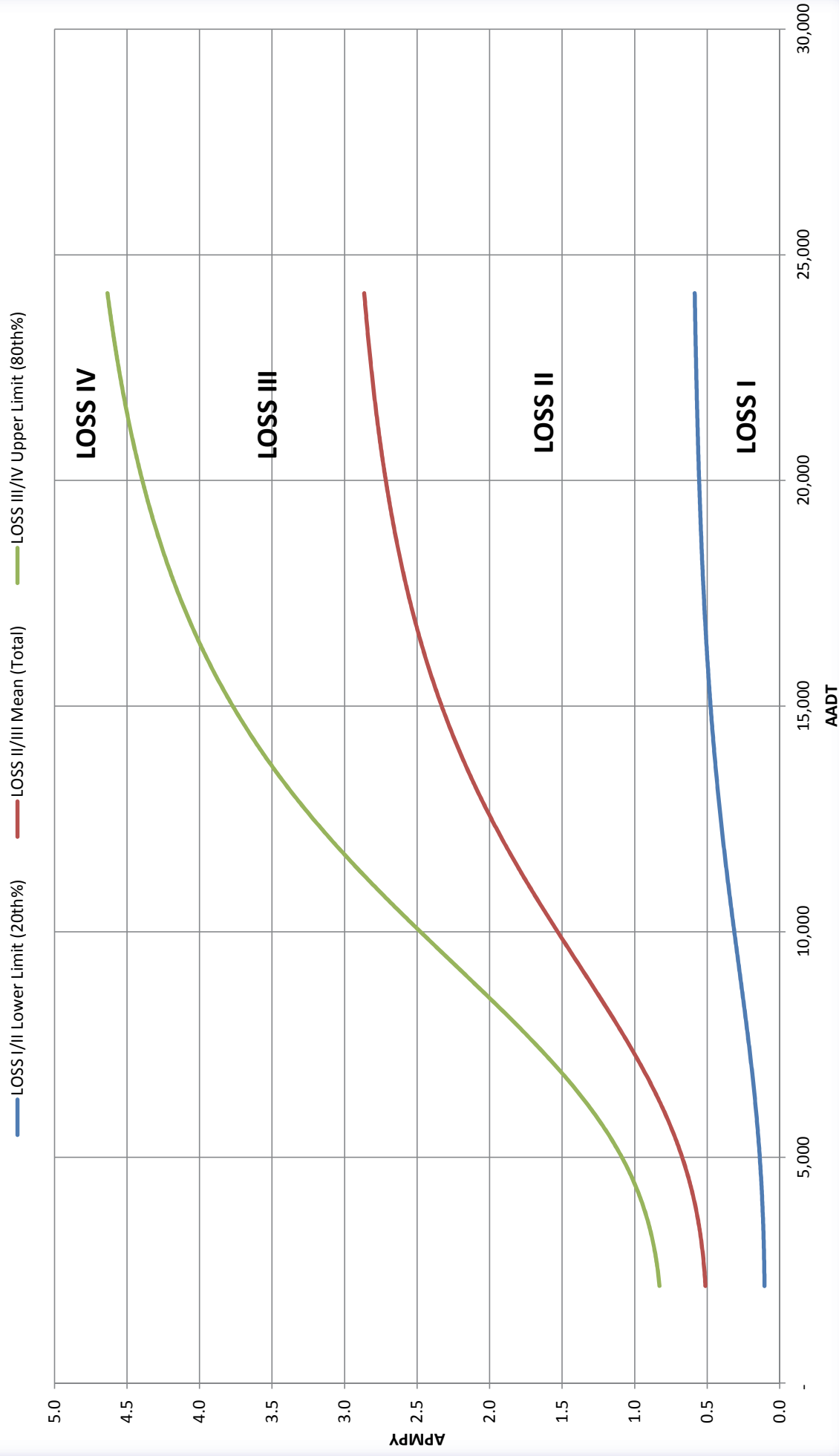
AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
21,950	0.2961	0.8981	1.3926
22,000	0.2967	0.8998	1.3951
22,050	0.2972	0.9014	1.3976
22,100	0.2977	0.9030	1.4001
22,150	0.2983	0.9046	1.4026
22,200	0.2988	0.9063	1.4052
22,250	0.2993	0.9079	1.4077
22,300	0.2999	0.9095	1.4102
22,350	0.3004	0.9111	1.4127
22,400	0.3009	0.9127	1.4152
22,450	0.3015	0.9144	1.4177
22,500	0.3020	0.9160	1.4202
22,550	0.3025	0.9176	1.4227
22,600	0.3031	0.9192	1.4252
22,650	0.3036	0.9208	1.4277
22,700	0.3041	0.9224	1.4302
22,750	0.3047	0.9241	1.4327
22,800	0.3052	0.9257	1.4352
22,850	0.3057	0.9273	1.4377
22,900	0.3063	0.9289	1.4402
22,950	0.3068	0.9305	1.4427
23,000	0.3073	0.9321	1.4452
23,050	0.3079	0.9337	1.4477
23,100	0.3084	0.9353	1.4502
23,150	0.3089	0.9369	1.4527
23,200	0.3095	0.9385	1.4552
23,250	0.3100	0.9401	1.4577
23,300	0.3105	0.9417	1.4602
23,350	0.3110	0.9434	1.4627
23,400	0.3116	0.9450	1.4651
23,450	0.3121	0.9466	1.4676
23,500	0.3126	0.9482	1.4701
23,550	0.3132	0.9498	1.4726
23,600	0.3137	0.9514	1.4751
23,650	0.3142	0.9530	1.4776
23,700	0.3147	0.9546	1.4800
23,750	0.3153	0.9562	1.4825
23,800	0.3158	0.9578	1.4850
23,850	0.3163	0.9594	1.4875
23,900	0.3168	0.9610	1.4900
23,950	0.3174	0.9626	1.4924
24,000	0.3179	0.9641	1.4949
24,050	0.3184	0.9657	1.4974
24,100	0.3189	0.9673	1.4998

Model: SPF - Rural Flat and Rolling 4-Lane Divided Freeways (ROR)

Dispersion (Alpha) = 6.7975E-01

<u>AADT</u>	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
24,150	0.3195	0.9689	1.5023

SPF - Rural Flat and Rolling 4-Lane Divided Freeways (ROR)



Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways (ROR)

Dispersion (Alpha) = 1.0712E+00

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
2,150	0.1048	0.5123	0.8289
2,200	0.1050	0.5132	0.8304
2,250	0.1052	0.5142	0.8320
2,300	0.1054	0.5152	0.8336
2,350	0.1056	0.5163	0.8354
2,400	0.1059	0.5174	0.8372
2,450	0.1061	0.5186	0.8391
2,500	0.1064	0.5198	0.8411
2,550	0.1066	0.5211	0.8432
2,600	0.1069	0.5224	0.8453
2,650	0.1072	0.5238	0.8476
2,700	0.1075	0.5253	0.8499
2,750	0.1078	0.5268	0.8524
2,800	0.1081	0.5284	0.8549
2,850	0.1084	0.5300	0.8576
2,900	0.1088	0.5317	0.8603
2,950	0.1091	0.5335	0.8632
3,000	0.1095	0.5353	0.8661
3,050	0.1099	0.5372	0.8692
3,100	0.1103	0.5392	0.8724
3,150	0.1107	0.5412	0.8757
3,200	0.1112	0.5433	0.8791
3,250	0.1116	0.5454	0.8826
3,300	0.1121	0.5477	0.8862
3,350	0.1125	0.5500	0.8899
3,400	0.1130	0.5524	0.8938
3,450	0.1135	0.5548	0.8978
3,500	0.1140	0.5574	0.9019
3,550	0.1146	0.5600	0.9061
3,600	0.1151	0.5627	0.9105
3,650	0.1157	0.5655	0.9149
3,700	0.1163	0.5683	0.9195
3,750	0.1169	0.5712	0.9243
3,800	0.1175	0.5742	0.9292
3,850	0.1181	0.5773	0.9342
3,900	0.1188	0.5805	0.9393
3,950	0.1194	0.5838	0.9446
4,000	0.1201	0.5871	0.9500
4,050	0.1208	0.5905	0.9555
4,100	0.1215	0.5940	0.9612
4,150	0.1223	0.5976	0.9670
4,200	0.1230	0.6013	0.9730
4,250	0.1238	0.6051	0.9790
4,300	0.1246	0.6089	0.9853

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways (ROR)

Dispersion (Alpha) = 1.0712E+00

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
4,350	0.1254	0.6129	0.9917
4,400	0.1262	0.6169	0.9982
4,450	0.1271	0.6210	1.0049
4,500	0.1279	0.6253	1.0117
4,550	0.1288	0.6296	1.0187
4,600	0.1297	0.6340	1.0258
4,650	0.1306	0.6384	1.0330
4,700	0.1316	0.6430	1.0404
4,750	0.1325	0.6477	1.0480
4,800	0.1335	0.6524	1.0557
4,850	0.1345	0.6573	1.0635
4,900	0.1355	0.6622	1.0715
4,950	0.1365	0.6673	1.0797
5,000	0.1376	0.6724	1.0880
5,050	0.1386	0.6776	1.0964
5,100	0.1397	0.6829	1.1050
5,150	0.1408	0.6884	1.1138
5,200	0.1420	0.6939	1.1227
5,250	0.1431	0.6994	1.1317
5,300	0.1443	0.7051	1.1409
5,350	0.1454	0.7109	1.1503
5,400	0.1467	0.7168	1.1598
5,450	0.1479	0.7227	1.1694
5,500	0.1491	0.7288	1.1792
5,550	0.1504	0.7349	1.1892
5,600	0.1516	0.7412	1.1993
5,650	0.1529	0.7475	1.2095
5,700	0.1542	0.7539	1.2199
5,750	0.1556	0.7604	1.2304
5,800	0.1569	0.7670	1.2411
5,850	0.1583	0.7737	1.2519
5,900	0.1597	0.7805	1.2629
5,950	0.1611	0.7873	1.2740
6,000	0.1625	0.7943	1.2852
6,050	0.1639	0.8013	1.2966
6,100	0.1654	0.8084	1.3081
6,150	0.1669	0.8157	1.3198
6,200	0.1684	0.8229	1.3316
6,250	0.1699	0.8303	1.3435
6,300	0.1714	0.8378	1.3556
6,350	0.1729	0.8453	1.3678
6,400	0.1745	0.8529	1.3801
6,450	0.1761	0.8606	1.3925
6,500	0.1777	0.8684	1.4051

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways (ROR)

Dispersion (Alpha) = 1.0712E+00

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
6,550	0.1793	0.8763	1.4178
6,600	0.1809	0.8842	1.4307
6,650	0.1825	0.8922	1.4436
6,700	0.1842	0.9003	1.4567
6,750	0.1859	0.9084	1.4699
6,800	0.1875	0.9167	1.4832
6,850	0.1892	0.9250	1.4967
6,900	0.1910	0.9333	1.5102
6,950	0.1927	0.9418	1.5239
7,000	0.1944	0.9503	1.5376
7,050	0.1962	0.9589	1.5515
7,100	0.1979	0.9675	1.5655
7,150	0.1997	0.9762	1.5796
7,200	0.2015	0.9850	1.5938
7,250	0.2033	0.9938	1.6080
7,300	0.2051	1.0027	1.6224
7,350	0.2070	1.0116	1.6369
7,400	0.2088	1.0207	1.6515
7,450	0.2107	1.0297	1.6661
7,500	0.2125	1.0388	1.6809
7,550	0.2144	1.0480	1.6957
7,600	0.2163	1.0572	1.7106
7,650	0.2182	1.0665	1.7256
7,700	0.2201	1.0758	1.7407
7,750	0.2220	1.0852	1.7559
7,800	0.2239	1.0946	1.7711
7,850	0.2259	1.1041	1.7864
7,900	0.2278	1.1136	1.8018
7,950	0.2298	1.1231	1.8172
8,000	0.2317	1.1327	1.8327
8,050	0.2337	1.1423	1.8483
8,100	0.2357	1.1519	1.8639
8,150	0.2377	1.1616	1.8796
8,200	0.2397	1.1714	1.8953
8,250	0.2417	1.1811	1.9111
8,300	0.2437	1.1909	1.9269
8,350	0.2457	1.2007	1.9428
8,400	0.2477	1.2106	1.9588
8,450	0.2497	1.2204	1.9747
8,500	0.2517	1.2303	1.9907
8,550	0.2537	1.2402	2.0068
8,600	0.2558	1.2502	2.0229
8,650	0.2578	1.2601	2.0390
8,700	0.2599	1.2701	2.0551

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways (ROR)

Dispersion (Alpha) = 1.0712E+00

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
8,750	0.2619	1.2801	2.0713
8,800	0.2639	1.2901	2.0875
8,850	0.2660	1.3001	2.1037
8,900	0.2681	1.3102	2.1199
8,950	0.2701	1.3202	2.1362
9,000	0.2722	1.3303	2.1524
9,050	0.2742	1.3403	2.1687
9,100	0.2763	1.3504	2.1850
9,150	0.2783	1.3605	2.2013
9,200	0.2804	1.3705	2.2176
9,250	0.2825	1.3806	2.2339
9,300	0.2845	1.3907	2.2502
9,350	0.2866	1.4008	2.2665
9,400	0.2887	1.4108	2.2828
9,450	0.2907	1.4209	2.2991
9,500	0.2928	1.4310	2.3154
9,550	0.2948	1.4410	2.3317
9,600	0.2969	1.4511	2.3480
9,650	0.2989	1.4611	2.3642
9,700	0.3010	1.4712	2.3804
9,750	0.3030	1.4812	2.3967
9,800	0.3051	1.4912	2.4129
9,850	0.3071	1.5012	2.4291
9,900	0.3092	1.5112	2.4452
9,950	0.3112	1.5212	2.4613
10,000	0.3133	1.5311	2.4774
10,050	0.3153	1.5411	2.4935
10,100	0.3173	1.5510	2.5096
10,150	0.3193	1.5609	2.5256
10,200	0.3214	1.5707	2.5416
10,250	0.3234	1.5806	2.5575
10,300	0.3254	1.5904	2.5734
10,350	0.3274	1.6002	2.5893
10,400	0.3294	1.6100	2.6051
10,450	0.3314	1.6198	2.6209
10,500	0.3334	1.6295	2.6366
10,550	0.3354	1.6392	2.6523
10,600	0.3373	1.6489	2.6679
10,650	0.3393	1.6585	2.6835
10,700	0.3413	1.6681	2.6991
10,750	0.3432	1.6777	2.7146
10,800	0.3452	1.6872	2.7300
10,850	0.3471	1.6967	2.7454
10,900	0.3491	1.7062	2.7607

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways (ROR)

Dispersion (Alpha) = 1.0712E+00

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
10,950	0.3510	1.7156	2.7760
11,000	0.3529	1.7250	2.7912
11,050	0.3549	1.7344	2.8064
11,100	0.3568	1.7437	2.8215
11,150	0.3587	1.7530	2.8365
11,200	0.3606	1.7623	2.8515
11,250	0.3624	1.7715	2.8664
11,300	0.3643	1.7807	2.8813
11,350	0.3662	1.7898	2.8960
11,400	0.3681	1.7989	2.9108
11,450	0.3699	1.8080	2.9254
11,500	0.3718	1.8170	2.9400
11,550	0.3736	1.8260	2.9545
11,600	0.3754	1.8349	2.9690
11,650	0.3772	1.8438	2.9834
11,700	0.3790	1.8526	2.9977
11,750	0.3808	1.8614	3.0119
11,800	0.3826	1.8702	3.0261
11,850	0.3844	1.8789	3.0402
11,900	0.3862	1.8876	3.0542
11,950	0.3880	1.8962	3.0681
12,000	0.3897	1.9047	3.0820
12,050	0.3914	1.9133	3.0958
12,100	0.3932	1.9218	3.1095
12,150	0.3949	1.9302	3.1232
12,200	0.3966	1.9386	3.1367
12,250	0.3983	1.9469	3.1502
12,300	0.4000	1.9552	3.1636
12,350	0.4017	1.9634	3.1770
12,400	0.4034	1.9716	3.1902
12,450	0.4051	1.9798	3.2034
12,500	0.4067	1.9879	3.2165
12,550	0.4084	1.9959	3.2295
12,600	0.4100	2.0039	3.2425
12,650	0.4116	2.0119	3.2553
12,700	0.4132	2.0198	3.2681
12,750	0.4148	2.0276	3.2808
12,800	0.4164	2.0354	3.2935
12,850	0.4180	2.0432	3.3060
12,900	0.4196	2.0509	3.3185
12,950	0.4212	2.0586	3.3309
13,000	0.4227	2.0662	3.3432
13,050	0.4243	2.0737	3.3554
13,100	0.4258	2.0812	3.3675

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways (ROR)

Dispersion (Alpha) = 1.0712E+00

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
13,150	0.4273	2.0887	3.3796
13,200	0.4289	2.0961	3.3916
13,250	0.4304	2.1034	3.4035
13,300	0.4319	2.1108	3.4153
13,350	0.4333	2.1180	3.4271
13,400	0.4348	2.1252	3.4387
13,450	0.4363	2.1324	3.4503
13,500	0.4377	2.1395	3.4618
13,550	0.4392	2.1465	3.4732
13,600	0.4406	2.1536	3.4846
13,650	0.4420	2.1605	3.4958
13,700	0.4434	2.1674	3.5070
13,750	0.4449	2.1743	3.5181
13,800	0.4462	2.1811	3.5291
13,850	0.4476	2.1879	3.5401
13,900	0.4490	2.1946	3.5509
13,950	0.4504	2.2012	3.5617
14,000	0.4517	2.2079	3.5724
14,050	0.4531	2.2144	3.5831
14,100	0.4544	2.2209	3.5936
14,150	0.4557	2.2274	3.6041
14,200	0.4570	2.2338	3.6145
14,250	0.4583	2.2402	3.6248
14,300	0.4596	2.2465	3.6350
14,350	0.4609	2.2528	3.6452
14,400	0.4622	2.2591	3.6553
14,450	0.4635	2.2653	3.6653
14,500	0.4647	2.2714	3.6752
14,550	0.4660	2.2775	3.6851
14,600	0.4672	2.2835	3.6949
14,650	0.4684	2.2895	3.7046
14,700	0.4696	2.2955	3.7142
14,750	0.4709	2.3014	3.7238
14,800	0.4721	2.3073	3.7333
14,850	0.4732	2.3131	3.7427
14,900	0.4744	2.3188	3.7520
14,950	0.4756	2.3246	3.7613
15,000	0.4768	2.3302	3.7705
15,050	0.4779	2.3359	3.7796
15,100	0.4791	2.3415	3.7886
15,150	0.4802	2.3470	3.7976
15,200	0.4813	2.3525	3.8065
15,250	0.4824	2.3580	3.8154
15,300	0.4835	2.3634	3.8241

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways (ROR)

Dispersion (Alpha) = 1.0712E+00

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
15,350	0.4846	2.3688	3.8328
15,400	0.4857	2.3741	3.8414
15,450	0.4868	2.3794	3.8500
15,500	0.4879	2.3846	3.8585
15,550	0.4890	2.3899	3.8669
15,600	0.4900	2.3950	3.8753
15,650	0.4911	2.4001	3.8836
15,700	0.4921	2.4052	3.8918
15,750	0.4931	2.4102	3.8999
15,800	0.4942	2.4152	3.9080
15,850	0.4952	2.4202	3.9160
15,900	0.4962	2.4251	3.9240
15,950	0.4972	2.4300	3.9319
16,000	0.4982	2.4348	3.9397
16,050	0.4991	2.4396	3.9475
16,100	0.5001	2.4444	3.9552
16,150	0.5011	2.4491	3.9628
16,200	0.5020	2.4538	3.9704
16,250	0.5030	2.4584	3.9779
16,300	0.5039	2.4630	3.9853
16,350	0.5049	2.4676	3.9927
16,400	0.5058	2.4721	4.0000
16,450	0.5067	2.4766	4.0073
16,500	0.5076	2.4811	4.0145
16,550	0.5085	2.4855	4.0216
16,600	0.5094	2.4899	4.0287
16,650	0.5103	2.4942	4.0357
16,700	0.5112	2.4985	4.0427
16,750	0.5121	2.5028	4.0496
16,800	0.5129	2.5070	4.0565
16,850	0.5138	2.5112	4.0633
16,900	0.5146	2.5154	4.0700
16,950	0.5155	2.5195	4.0767
17,000	0.5163	2.5236	4.0833
17,050	0.5171	2.5277	4.0899
17,100	0.5180	2.5317	4.0964
17,150	0.5188	2.5357	4.1029
17,200	0.5196	2.5396	4.1093
17,250	0.5204	2.5436	4.1156
17,300	0.5212	2.5475	4.1219
17,350	0.5220	2.5513	4.1282
17,400	0.5228	2.5552	4.1344
17,450	0.5236	2.5590	4.1405
17,500	0.5243	2.5627	4.1466

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways (ROR)

Dispersion (Alpha) = 1.0712E+00

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
17,550	0.5251	2.5665	4.1527
17,600	0.5258	2.5702	4.1587
17,650	0.5266	2.5738	4.1646
17,700	0.5273	2.5775	4.1705
17,750	0.5281	2.5811	4.1763
17,800	0.5288	2.5847	4.1821
17,850	0.5295	2.5882	4.1879
17,900	0.5303	2.5917	4.1936
17,950	0.5310	2.5952	4.1992
18,000	0.5317	2.5987	4.2048
18,050	0.5324	2.6021	4.2104
18,100	0.5331	2.6055	4.2159
18,150	0.5338	2.6089	4.2213
18,200	0.5345	2.6122	4.2268
18,250	0.5351	2.6156	4.2321
18,300	0.5358	2.6188	4.2374
18,350	0.5365	2.6221	4.2427
18,400	0.5371	2.6253	4.2480
18,450	0.5378	2.6286	4.2531
18,500	0.5384	2.6317	4.2583
18,550	0.5391	2.6349	4.2634
18,600	0.5397	2.6380	4.2685
18,650	0.5404	2.6411	4.2735
18,700	0.5410	2.6442	4.2785
18,750	0.5416	2.6472	4.2834
18,800	0.5422	2.6503	4.2883
18,850	0.5428	2.6533	4.2931
18,900	0.5435	2.6562	4.2979
18,950	0.5441	2.6592	4.3027
19,000	0.5447	2.6621	4.3075
19,050	0.5453	2.6650	4.3121
19,100	0.5458	2.6679	4.3168
19,150	0.5464	2.6707	4.3214
19,200	0.5470	2.6736	4.3260
19,250	0.5476	2.6764	4.3305
19,300	0.5481	2.6792	4.3350
19,350	0.5487	2.6819	4.3395
19,400	0.5493	2.6846	4.3439
19,450	0.5498	2.6874	4.3483
19,500	0.5504	2.6900	4.3526
19,550	0.5509	2.6927	4.3570
19,600	0.5515	2.6954	4.3612
19,650	0.5520	2.6980	4.3655
19,700	0.5525	2.7006	4.3697

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways (ROR)

Dispersion (Alpha) = 1.0712E+00

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
19,750	0.5531	2.7032	4.3739
19,800	0.5536	2.7057	4.3780
19,850	0.5541	2.7082	4.3821
19,900	0.5546	2.7108	4.3862
19,950	0.5551	2.7133	4.3902
20,000	0.5556	2.7157	4.3942
20,050	0.5561	2.7182	4.3982
20,100	0.5566	2.7206	4.4021
20,150	0.5571	2.7230	4.4060
20,200	0.5576	2.7254	4.4099
20,250	0.5581	2.7278	4.4137
20,300	0.5586	2.7301	4.4175
20,350	0.5591	2.7325	4.4213
20,400	0.5595	2.7348	4.4250
20,450	0.5600	2.7371	4.4287
20,500	0.5605	2.7394	4.4324
20,550	0.5609	2.7416	4.4361
20,600	0.5614	2.7439	4.4397
20,650	0.5618	2.7461	4.4433
20,700	0.5623	2.7483	4.4469
20,750	0.5627	2.7505	4.4504
20,800	0.5632	2.7526	4.4539
20,850	0.5636	2.7548	4.4574
20,900	0.5641	2.7569	4.4608
20,950	0.5645	2.7590	4.4642
21,000	0.5649	2.7611	4.4676
21,050	0.5653	2.7632	4.4710
21,100	0.5658	2.7652	4.4743
21,150	0.5662	2.7673	4.4776
21,200	0.5666	2.7693	4.4809
21,250	0.5670	2.7713	4.4842
21,300	0.5674	2.7733	4.4874
21,350	0.5678	2.7753	4.4906
21,400	0.5682	2.7773	4.4938
21,450	0.5686	2.7792	4.4969
21,500	0.5690	2.7812	4.5001
21,550	0.5694	2.7831	4.5032
21,600	0.5698	2.7850	4.5062
21,650	0.5702	2.7869	4.5093
21,700	0.5706	2.7887	4.5123
21,750	0.5709	2.7906	4.5153
21,800	0.5713	2.7924	4.5183
21,850	0.5717	2.7942	4.5212
21,900	0.5721	2.7961	4.5242

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Freeways (ROR)

Dispersion (Alpha) = 1.0712E+00

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
21,950	0.5724	2.7978	4.5271
22,000	0.5728	2.7996	4.5300
22,050	0.5732	2.8014	4.5328
22,100	0.5735	2.8031	4.5356
22,150	0.5739	2.8049	4.5385
22,200	0.5742	2.8066	4.5413
22,250	0.5746	2.8083	4.5440
22,300	0.5749	2.8100	4.5468
22,350	0.5753	2.8117	4.5495
22,400	0.5756	2.8134	4.5522
22,450	0.5759	2.8150	4.5549
22,500	0.5763	2.8167	4.5575
22,550	0.5766	2.8183	4.5602
22,600	0.5769	2.8199	4.5628
22,650	0.5773	2.8215	4.5654
22,700	0.5776	2.8231	4.5680
22,750	0.5779	2.8247	4.5705
22,800	0.5782	2.8263	4.5731
22,850	0.5786	2.8278	4.5756
22,900	0.5789	2.8294	4.5781
22,950	0.5792	2.8309	4.5806
23,000	0.5795	2.8324	4.5830
23,050	0.5798	2.8339	4.5854
23,100	0.5801	2.8354	4.5879
23,150	0.5804	2.8369	4.5903
23,200	0.5807	2.8384	4.5926
23,250	0.5810	2.8398	4.5950
23,300	0.5813	2.8413	4.5974
23,350	0.5816	2.8427	4.5997
23,400	0.5819	2.8441	4.6020
23,450	0.5822	2.8456	4.6043
23,500	0.5825	2.8470	4.6066
23,550	0.5828	2.8484	4.6088
23,600	0.5830	2.8497	4.6110
23,650	0.5833	2.8511	4.6133
23,700	0.5836	2.8525	4.6155
23,750	0.5839	2.8538	4.6177
23,800	0.5842	2.8552	4.6198
23,850	0.5844	2.8565	4.6220
23,900	0.5847	2.8578	4.6241
23,950	0.5850	2.8591	4.6262
24,000	0.5852	2.8604	4.6283
24,050	0.5855	2.8617	4.6304
24,100	0.5858	2.8630	4.6325

Model: SPF - Rural Flat and Rolling 4-Lane Divided Freeways (ROR)

Dispersion (Alpha) = 1.0712E+00

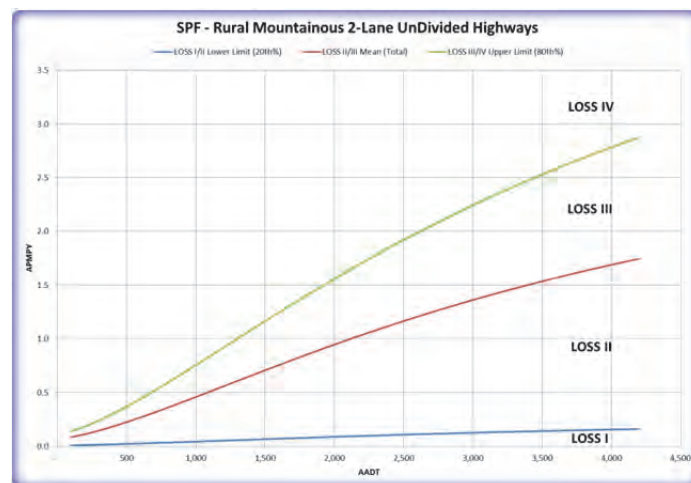
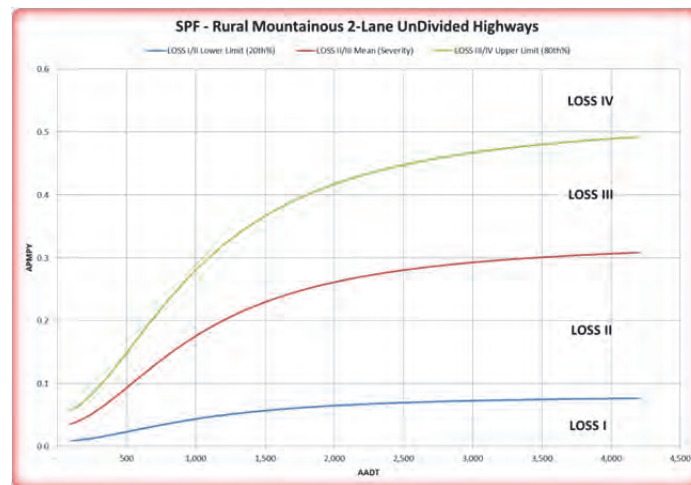
<u>AADT</u>	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
24,150	0.5860	2.8643	4.6345

Montana Rural Flat and Rolling 4-Lane Divided Freeways (ROR)								
Description	0 - 0 ADT		0 - 12000 ADT		> 12000 ADT		All Totals	
	Accidents	Percent	Accidents	Percent	Accidents	Percent	Accidents	Percent
Severity								
PDO	0		2,121	63.67%	379	68.91%	2,500	64.42%
INJ	0		1,123	33.71%	165	30.00%	1,288	33.19%
FAT	0		87	2.61%	6	1.09%	93	2.40%
Persons Injured	0		1,657	N/A	205	N/A	1,862	N/A
Persons Killed	0		92	N/A	7	N/A	99	N/A
Number of Vehicles								
Single Vehicle Accidents	0		3,257	97.78%	526	95.64%	3,783	97.47%
Two Vehicle Accidents	0		67	2.01%	20	3.64%	87	2.24%
Three or more Vehicle Accident	0		7	0.21%	4	0.73%	11	0.28%
Unknown Number of Vehicles	0		0	0.00%	0	0.00%	0	0.00%
Location								
On Road	0		1,171	35.15%	227	41.27%	1,398	36.02%
Off Road	0		1,514	45.45%	222	40.36%	1,736	44.73%
Off Road Left	0		787	23.63%	115	20.91%	902	23.24%
Off Road Right	0		727	21.83%	107	19.45%	834	21.49%
Off Road at Tee	0		0	0.00%	0	0.00%	0	0.00%
Off Road in Median	0		0	0.00%	0	0.00%	0	0.00%
Unknown Road Location	0		646	19.39%	101	18.36%	747	19.25%
Accident Type								
Overturning	0		1,537	46.14%	182	33.09%	1,719	44.29%
Other Non Collision	0		0	0.00%	0	0.00%	0	0.00%
School Age Pedestrians	0		0	0.00%	0	0.00%	0	0.00%
All Other Pedestrians	0		0	0.00%	0	0.00%	0	0.00%
Broadside	0		0	0.00%	0	0.00%	0	0.00%
Head On	0		17	0.51%	11	2.00%	28	0.72%
Rear End	0		0	0.00%	0	0.00%	0	0.00%
Sideswipe (Same Direction)	0		0	0.00%	0	0.00%	0	0.00%
Sideswipe (Opposite Direction)	0		17	0.51%	5	0.91%	22	0.57%
Approach Turn	0		0	0.00%	0	0.00%	0	0.00%
Overtaking Turn	0		0	0.00%	0	0.00%	0	0.00%
Parked Motor Vehicle	0		0	0.00%	0	0.00%	0	0.00%
Railway Vehicle	0		0	0.00%	0	0.00%	0	0.00%
Bicycle	0		0	0.00%	0	0.00%	0	0.00%
Motorized Bicycle	0		0	0.00%	0	0.00%	0	0.00%
Domestic Animal	0		0	0.00%	0	0.00%	0	0.00%
Wild Animal	0		0	0.00%	0	0.00%	0	0.00%
Light or Utility Pole	0		11	0.33%	12	2.18%	23	0.59%
Traffic Signal Pole	0		0	0.00%	0	0.00%	0	0.00%
Sign	0		43	1.29%	8	1.45%	51	1.31%
Bridge Rail	0		98	2.94%	16	2.91%	114	2.94%
Guard Rail	0		551	16.54%	113	20.55%	664	17.11%
Cable Rail	0		0	0.00%	0	0.00%	0	0.00%
Median Barrier	0		225	6.75%	66	12.00%	291	7.50%
Bridge Abutment	0		0	0.00%	0	0.00%	0	0.00%
Column or Pier	0		18	0.54%	0	0.00%	18	0.46%
Culvert or Headwall	0		19	0.57%	1	0.18%	20	0.52%
Embankment	0		284	8.53%	39	7.09%	323	8.32%
Curb	0		1	0.03%	0	0.00%	1	0.03%
Delineator Post	0		0	0.00%	0	0.00%	0	0.00%
Fence	0		282	8.47%	52	9.45%	334	8.61%
Tree	0		24	0.72%	0	0.00%	24	0.62%
Large Boulder	0		7	0.21%	4	0.73%	11	0.28%
Rocks in Roadway	0		0	0.00%	0	0.00%	0	0.00%
Barricade	0		0	0.00%	0	0.00%	0	0.00%
Wall or Building	0		0	0.00%	0	0.00%	0	0.00%
Crash Cushion	0		6	0.18%	0	0.00%	6	0.15%
Mailbox	0		0	0.00%	0	0.00%	0	0.00%
Other Fixed Object	0		90	2.70%	13	2.36%	103	2.65%
Involving Other Object	0		101	3.03%	28	5.09%	129	3.32%
Road Maintenance Equipment	0		0	0.00%	0	0.00%	0	0.00%
Unknown Accident Type	0		0	0.00%	0	0.00%	0	0.00%
Total Fixed Objects	0		1,659	49.80%	324	58.91%	1,983	51.10%
Total Other Objects	0		101	3.03%	28	5.09%	129	3.32%

Montana Rural Flat and Rolling 4-Lane Divided Freeways (ROR)								
Description	0 - 0 ADT		0 - 12000 ADT		> 12000 ADT		All Totals	
	Accidents	Percent	Accidents	Percent	Accidents	Percent	Accidents	Percent
Lighting								
Daylight	0		2,045	61.39%	342	62.18%	2,387	61.50%
Dawn or Dusk	0		159	4.77%	28	5.09%	187	4.82%
Dark - Lighted	0		42	1.26%	19	3.45%	61	1.57%
Dark - Unlighted	0		1,081	32.45%	161	29.27%	1,242	32.00%
Unknown Lighting	0		4	0.12%	0	0.00%	4	0.10%
Weather								
No Adverse Weather	0		2,165	65.00%	361	65.64%	2,526	65.09%
Rain	0		96	2.88%	13	2.36%	109	2.81%
Snow or Sleet or Hail	0		937	28.13%	167	30.36%	1,104	28.45%
Fog	0		37	1.11%	4	0.73%	41	1.06%
Dust	0		3	0.09%	0	0.00%	3	0.08%
Wind	0		88	2.64%	4	0.73%	92	2.37%
Unknown Weather	0		5	0.15%	1	0.18%	6	0.15%
Road Condition								
Dry Road	0		1,294	38.85%	216	39.27%	1,510	38.91%
Wet Road	0		202	6.06%	42	7.64%	244	6.29%
Muddy Road	0		1	0.03%	0	0.00%	1	0.03%
Snowy Road	0		607	18.22%	105	19.09%	712	18.35%
Icy Road	0		1,219	36.60%	184	33.45%	1,403	36.15%
Slushy Road	0		0	0.00%	0	0.00%	0	0.00%
Foreign Material Road	0		0	0.00%	0	0.00%	0	0.00%
With Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Dry with Icy Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Wet with Icy Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Snowy with Icy Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Icy with Icy Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Slushy with Icy Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Unknown Road Condition	0		8	0.24%	3	0.55%	11	0.28%
Contributing Factor								
No Apparent Contributing Factor	0		146	4.38%	35	6.36%	181	4.66%
Asleep at the Wheel	0		165	4.95%	21	3.82%	186	4.79%
Illness	0		0	0.00%	0	0.00%	0	0.00%
Distracted by Passenger	0		2	0.06%	0	0.00%	2	0.05%
Driver Inexperience	0		0	0.00%	0	0.00%	0	0.00%
Driver Fatigue	0		0	0.00%	0	0.00%	0	0.00%
Driver Preoccupied	0		139	4.17%	20	3.64%	159	4.10%
Driver Unfamiliar with Area	0		0	0.00%	0	0.00%	0	0.00%
Driver Emotionally Upset	0		0	0.00%	0	0.00%	0	0.00%
Evading Law Enforcement Officer	0		0	0.00%	0	0.00%	0	0.00%
Physical Disability	0		0	0.00%	0	0.00%	0	0.00%
Unknown Contributing Factor	0		2,879	86.43%	474	86.18%	3,353	86.40%
Condition of Driver								
No Impairment Suspected	0		2,985	89.61%	474	86.18%	3,459	89.13%
Alcohol Involved	0		187	5.61%	41	7.45%	228	5.87%
RX Drugs or Medication Involved	0		0	0.00%	0	0.00%	0	0.00%
Illegal Drugs Involved	0		42	1.26%	7	1.27%	49	1.26%
Alcohol and Drugs Involved	0		36	1.08%	15	2.73%	51	1.31%
Driver/Pedestrian Not Observed	0		9	0.27%	1	0.18%	10	0.26%
Unknown Condition	0		72	2.16%	12	2.18%	84	2.16%
Total Accidents:	0		3,331	85.83%	550	14.17%	3,881	100.00%

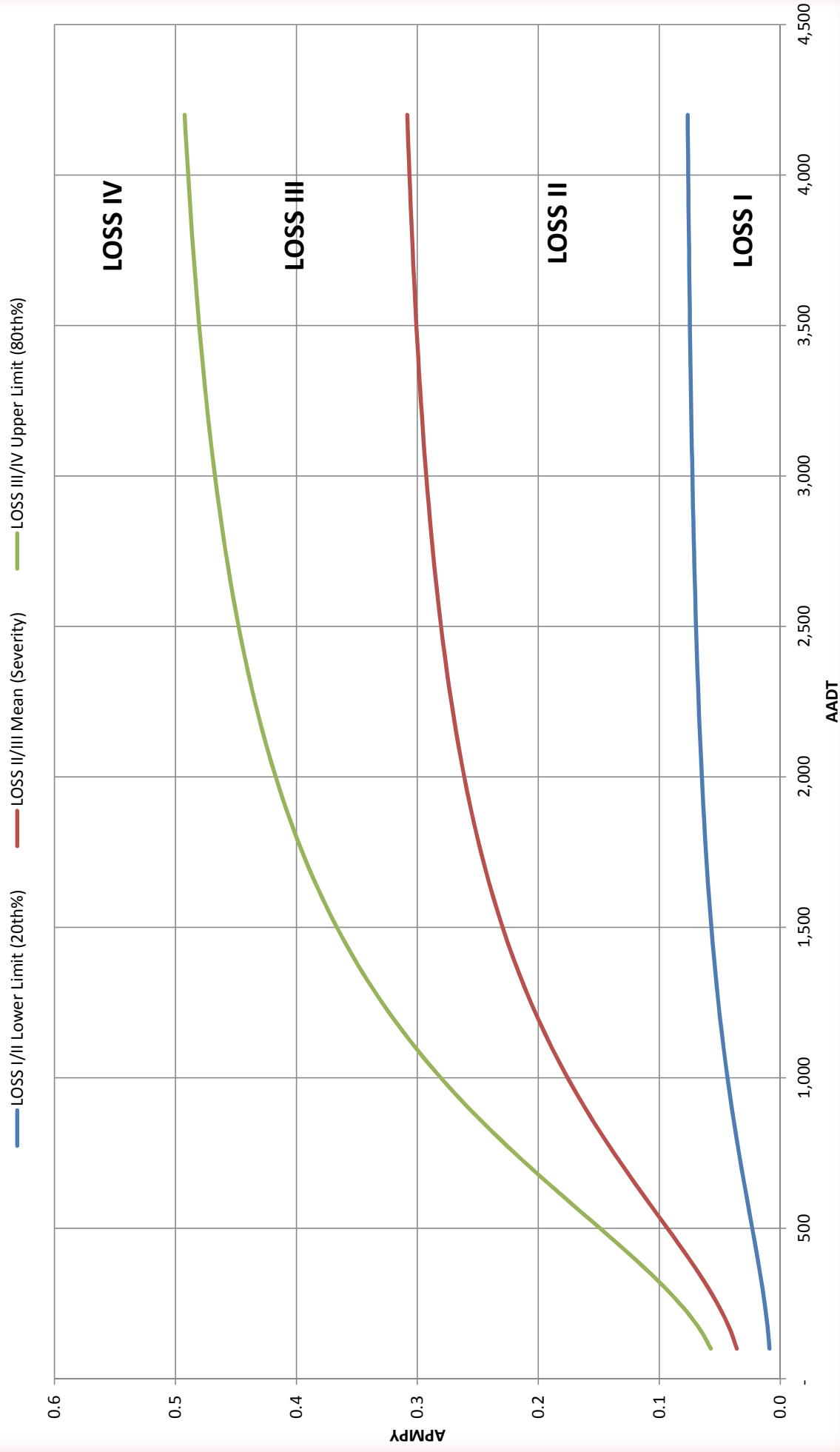


Montana Rural Mountainous 2-Lane UnDivided Highways



SPF, LOSS, and Diagnostic Norms

SPF - Rural Mountainous 2-Lane UnDivided Highways



Model:

SPF - Rural Mountainous 2-Lane UnDivided Highways

Dispersion (Alpha) = 9.1237E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
100	0.0089	0.0360	0.0574
150	0.0100	0.0402	0.0642
200	0.0113	0.0456	0.0728
250	0.0129	0.0520	0.0831
300	0.0147	0.0593	0.0947
350	0.0167	0.0672	0.1074
400	0.0188	0.0757	0.1208
450	0.0210	0.0844	0.1348
500	0.0232	0.0933	0.1490
550	0.0254	0.1023	0.1634
600	0.0276	0.1113	0.1778
650	0.0298	0.1202	0.1920
700	0.0320	0.1290	0.2059
750	0.0341	0.1375	0.2195
800	0.0362	0.1457	0.2327
850	0.0382	0.1537	0.2454
900	0.0401	0.1614	0.2577
950	0.0419	0.1687	0.2694
1,000	0.0436	0.1757	0.2806
1,050	0.0453	0.1824	0.2913
1,100	0.0469	0.1888	0.3015
1,150	0.0484	0.1949	0.3112
1,200	0.0498	0.2006	0.3204
1,250	0.0512	0.2061	0.3291
1,300	0.0525	0.2113	0.3374
1,350	0.0537	0.2162	0.3453
1,400	0.0548	0.2209	0.3528
1,450	0.0559	0.2253	0.3598
1,500	0.0570	0.2295	0.3665
1,550	0.0580	0.2335	0.3729
1,600	0.0589	0.2373	0.3789
1,650	0.0598	0.2408	0.3846
1,700	0.0606	0.2442	0.3900
1,750	0.0614	0.2474	0.3951
1,800	0.0622	0.2505	0.4000
1,850	0.0629	0.2534	0.4046
1,900	0.0636	0.2561	0.4090
1,950	0.0642	0.2587	0.4132
2,000	0.0648	0.2612	0.4171
2,050	0.0654	0.2636	0.4209
2,100	0.0660	0.2658	0.4245
2,150	0.0665	0.2680	0.4279
2,200	0.0670	0.2700	0.4312
2,250	0.0675	0.2719	0.4343

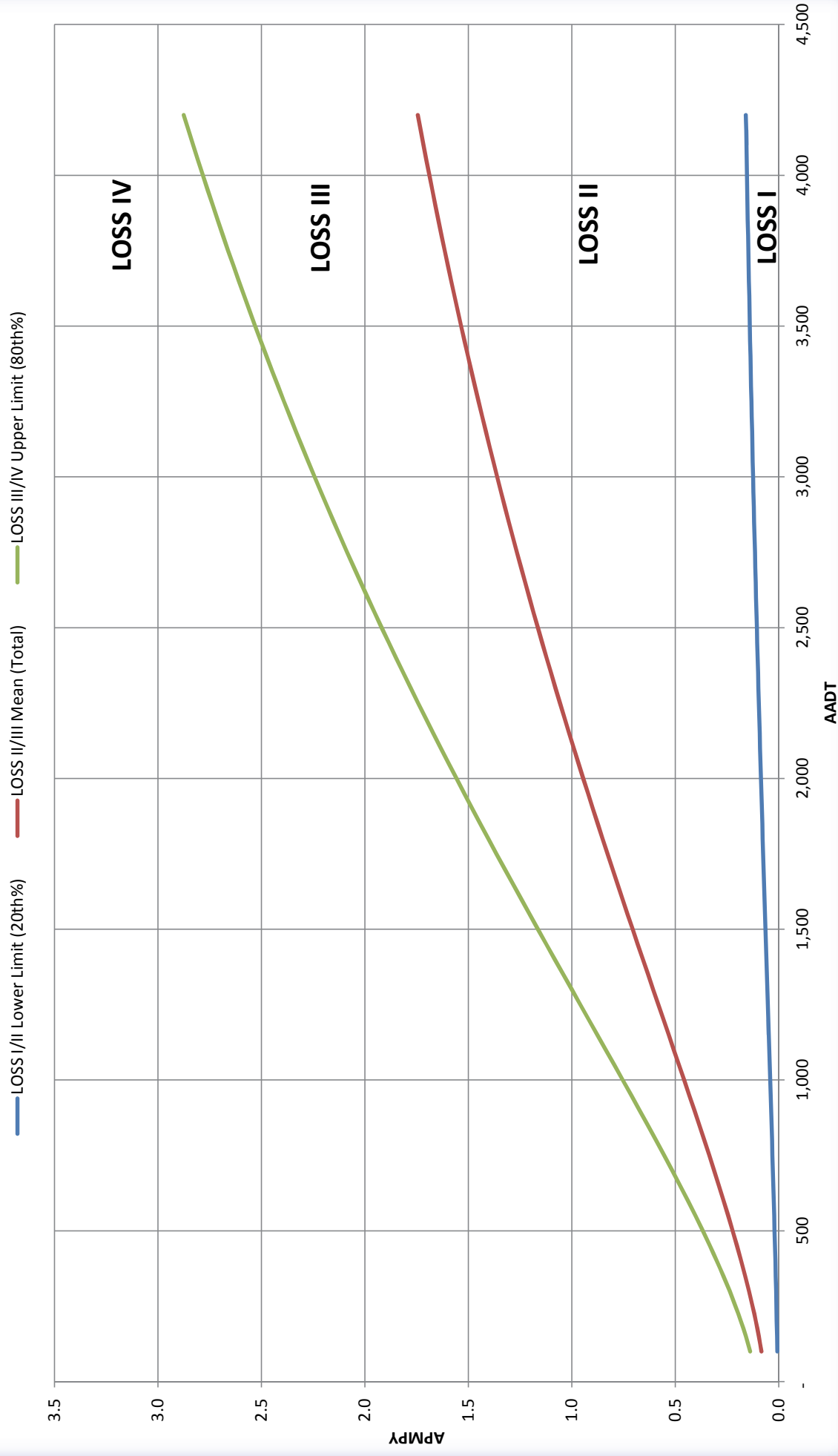
Model:

SPF - Rural Mountainous 2-Lane UnDivided Highways

Dispersion (Alpha) = 9.1237E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
2,300	0.0680	0.2738	0.4372
2,350	0.0684	0.2756	0.4400
2,400	0.0688	0.2773	0.4427
2,450	0.0692	0.2789	0.4453
2,500	0.0696	0.2804	0.4478
2,550	0.0700	0.2819	0.4501
2,600	0.0703	0.2833	0.4524
2,650	0.0707	0.2846	0.4545
2,700	0.0710	0.2859	0.4566
2,750	0.0713	0.2872	0.4586
2,800	0.0716	0.2883	0.4604
2,850	0.0719	0.2895	0.4623
2,900	0.0721	0.2906	0.4640
2,950	0.0724	0.2916	0.4657
3,000	0.0726	0.2926	0.4673
3,050	0.0729	0.2936	0.4688
3,100	0.0731	0.2945	0.4703
3,150	0.0733	0.2954	0.4717
3,200	0.0735	0.2963	0.4731
3,250	0.0738	0.2971	0.4744
3,300	0.0740	0.2979	0.4757
3,350	0.0741	0.2987	0.4769
3,400	0.0743	0.2994	0.4781
3,450	0.0745	0.3001	0.4792
3,500	0.0747	0.3008	0.4803
3,550	0.0748	0.3015	0.4814
3,600	0.0750	0.3021	0.4824
3,650	0.0752	0.3027	0.4834
3,700	0.0753	0.3033	0.4844
3,750	0.0754	0.3039	0.4853
3,800	0.0756	0.3045	0.4862
3,850	0.0757	0.3050	0.4870
3,900	0.0758	0.3055	0.4879
3,950	0.0760	0.3060	0.4887
4,000	0.0761	0.3065	0.4895
4,050	0.0762	0.3070	0.4902
4,100	0.0763	0.3074	0.4909
4,150	0.0764	0.3079	0.4917
4,200	0.0765	0.3083	0.4923

SPF - Rural Mountainous 2-Lane UnDivided Highways



Model:

SPF - Rural Mountainous 2-Lane UnDivided Highways

Dispersion (Alpha) = 1.7235E+00

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
100	0.0077	0.0841	0.1387
150	0.0088	0.0966	0.1592
200	0.0101	0.1109	0.1828
250	0.0116	0.1268	0.2090
300	0.0131	0.1440	0.2374
350	0.0148	0.1624	0.2677
400	0.0166	0.1818	0.2996
450	0.0184	0.2020	0.3329
500	0.0203	0.2229	0.3674
550	0.0223	0.2445	0.4030
600	0.0243	0.2667	0.4396
650	0.0264	0.2894	0.4770
700	0.0285	0.3125	0.5151
750	0.0307	0.3360	0.5539
800	0.0328	0.3599	0.5931
850	0.0350	0.3840	0.6329
900	0.0373	0.4083	0.6730
950	0.0395	0.4328	0.7134
1,000	0.0417	0.4575	0.7541
1,050	0.0440	0.4823	0.7949
1,100	0.0463	0.5072	0.8359
1,150	0.0485	0.5321	0.8770
1,200	0.0508	0.5571	0.9182
1,250	0.0531	0.5820	0.9593
1,300	0.0554	0.6070	1.0004
1,350	0.0576	0.6319	1.0415
1,400	0.0599	0.6567	1.0824
1,450	0.0622	0.6815	1.1232
1,500	0.0644	0.7062	1.1639
1,550	0.0667	0.7307	1.2044
1,600	0.0689	0.7552	1.2447
1,650	0.0711	0.7795	1.2847
1,700	0.0733	0.8036	1.3246
1,750	0.0755	0.8276	1.3641
1,800	0.0777	0.8515	1.4034
1,850	0.0798	0.8751	1.4424
1,900	0.0820	0.8986	1.4811
1,950	0.0841	0.9219	1.5195
2,000	0.0862	0.9450	1.5575
2,050	0.0883	0.9679	1.5953
2,100	0.0904	0.9906	1.6327
2,150	0.0924	1.0130	1.6697
2,200	0.0945	1.0353	1.7064
2,250	0.0965	1.0573	1.7427

Model:

SPF - Rural Mountainous 2-Lane UnDivided Highways

Dispersion (Alpha) = 1.7235E+00

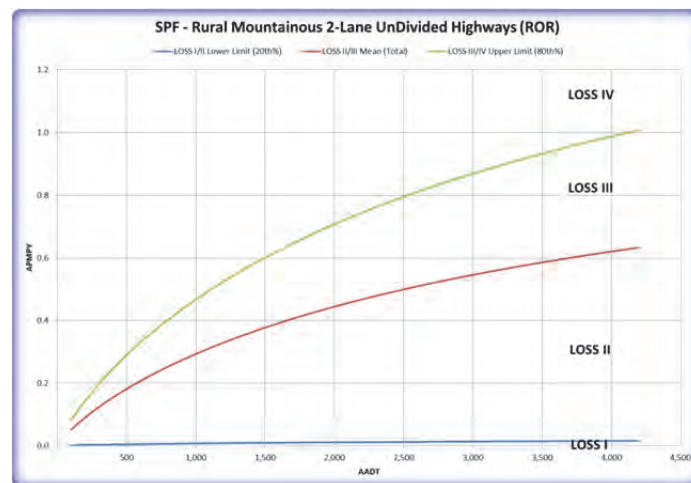
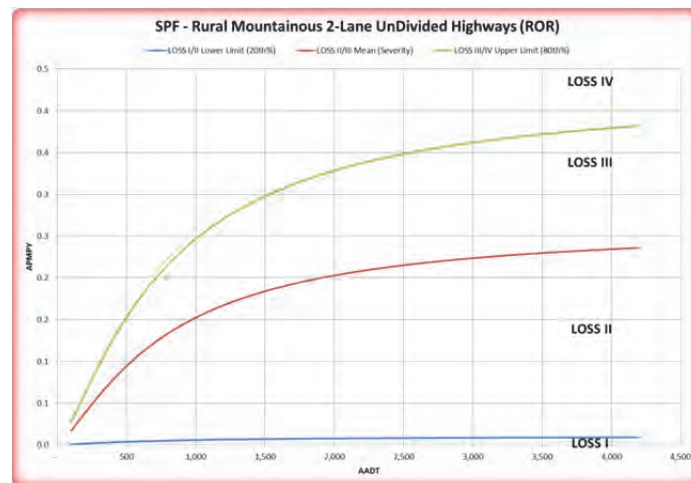
AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
2,300	0.0985	1.0792	1.7787
2,350	0.1004	1.1008	1.8143
2,400	0.1024	1.1221	1.8495
2,450	0.1043	1.1433	1.8844
2,500	0.1062	1.1642	1.9188
2,550	0.1081	1.1849	1.9529
2,600	0.1100	1.2053	1.9867
2,650	0.1118	1.2256	2.0200
2,700	0.1136	1.2456	2.0530
2,750	0.1154	1.2653	2.0855
2,800	0.1172	1.2849	2.1178
2,850	0.1190	1.3042	2.1496
2,900	0.1207	1.3233	2.1810
2,950	0.1224	1.3421	2.2121
3,000	0.1241	1.3607	2.2428
3,050	0.1258	1.3791	2.2731
3,100	0.1275	1.3973	2.3031
3,150	0.1291	1.4153	2.3327
3,200	0.1307	1.4330	2.3619
3,250	0.1323	1.4505	2.3908
3,300	0.1339	1.4678	2.4193
3,350	0.1355	1.4849	2.4474
3,400	0.1370	1.5018	2.4752
3,450	0.1385	1.5184	2.5027
3,500	0.1400	1.5349	2.5298
3,550	0.1415	1.5511	2.5566
3,600	0.1430	1.5671	2.5830
3,650	0.1444	1.5830	2.6091
3,700	0.1458	1.5986	2.6349
3,750	0.1473	1.6140	2.6603
3,800	0.1486	1.6293	2.6854
3,850	0.1500	1.6443	2.7102
3,900	0.1514	1.6592	2.7347
3,950	0.1527	1.6738	2.7588
4,000	0.1540	1.6883	2.7827
4,050	0.1553	1.7026	2.8062
4,100	0.1566	1.7167	2.8295
4,150	0.1579	1.7306	2.8524
4,200	0.1591	1.7443	2.8751

Montana Rural Mountainous 2-Lane Undivided Highways								
Description	0 - 0 ADT		0 - 1500 ADT		> 1500 ADT		All Totals	
	Accidents	Percent	Accidents	Percent	Accidents	Percent	Accidents	Percent
Severity								
PDO	0		456	59.14%	570	77.24%	1,026	67.99%
INJ	0		295	38.26%	154	20.87%	449	29.75%
FAT	0		20	2.59%	14	1.90%	34	2.25%
Persons Injured	0		403	N/A	222	N/A	625	N/A
Persons Killed	0		21	N/A	20	N/A	41	N/A
Number of Vehicles								
Single Vehicle Accidents	0		699	90.66%	649	87.94%	1,348	89.33%
Two Vehicle Accidents	0		65	8.43%	85	11.52%	150	9.94%
Three or more Vehicle Accident	0		7	0.91%	4	0.54%	11	0.73%
Unknown Number of Vehicles	0		0	0.00%	0	0.00%	0	0.00%
Location								
On Road	0		339	43.97%	449	60.84%	788	52.22%
Off Road	0		292	37.87%	145	19.65%	437	28.96%
Off Road Left	0		119	15.43%	57	7.72%	176	11.66%
Off Road Right	0		173	22.44%	88	11.92%	261	17.30%
Off Road at Tee	0		0	0.00%	0	0.00%	0	0.00%
Off Road in Median	0		0	0.00%	0	0.00%	0	0.00%
Unknown Road Location	0		140	18.16%	144	19.51%	284	18.82%
Accident Type								
Overturning	0		246	31.91%	111	15.04%	357	23.66%
Other Non Collision	0		21	2.72%	14	1.90%	35	2.32%
School Age Pedestrians	0		0	0.00%	0	0.00%	0	0.00%
All Other Pedestrians	0		0	0.00%	2	0.27%	2	0.13%
Broadside	0		5	0.65%	14	1.90%	19	1.26%
Head On	0		12	1.56%	7	0.95%	19	1.26%
Rear End	0		21	2.72%	22	2.98%	43	2.85%
Sideswipe (Same Direction)	0		3	0.39%	5	0.68%	8	0.53%
Sideswipe (Opposite Direction)	0		19	2.46%	19	2.57%	38	2.52%
Approach Turn	0		0	0.00%	0	0.00%	0	0.00%
Overtaking Turn	0		0	0.00%	0	0.00%	0	0.00%
Parked Motor Vehicle	0		2	0.26%	6	0.81%	8	0.53%
Railway Vehicle	0		0	0.00%	0	0.00%	0	0.00%
Bicycle	0		0	0.00%	0	0.00%	0	0.00%
Motorized Bicycle	0		0	0.00%	0	0.00%	0	0.00%
Domestic Animal	0		15	1.95%	13	1.76%	28	1.86%
Wild Animal	0		149	19.33%	318	43.09%	467	30.95%
Light or Utility Pole	0		6	0.78%	2	0.27%	8	0.53%
Traffic Signal Pole	0		0	0.00%	0	0.00%	0	0.00%
Sign	0		1	0.13%	7	0.95%	8	0.53%
Bridge Rail	0		2	0.26%	1	0.14%	3	0.20%
Guard Rail	0		55	7.13%	50	6.78%	105	6.96%
Cable Rail	0		0	0.00%	0	0.00%	0	0.00%
Median Barrier	0		3	0.39%	4	0.54%	7	0.46%
Bridge Abutment	0		0	0.00%	0	0.00%	0	0.00%
Column or Pier	0		0	0.00%	0	0.00%	0	0.00%
Culvert or Headwall	0		4	0.52%	3	0.41%	7	0.46%
Embankment	0		83	10.77%	47	6.37%	130	8.61%
Curb	0		0	0.00%	0	0.00%	0	0.00%
Delineator Post	0		0	0.00%	0	0.00%	0	0.00%
Fence	0		10	1.30%	21	2.85%	31	2.05%
Tree	0		71	9.21%	26	3.52%	97	6.43%
Large Boulder	0		15	1.95%	4	0.54%	19	1.26%
Rocks in Roadway	0		0	0.00%	0	0.00%	0	0.00%
Barricade	0		0	0.00%	0	0.00%	0	0.00%
Wall or Building	0		0	0.00%	0	0.00%	0	0.00%
Crash Cushion	0		0	0.00%	1	0.14%	1	0.07%
Mailbox	0		1	0.13%	1	0.14%	2	0.13%
Other Fixed Object	0		20	2.59%	22	2.98%	42	2.78%
Involving Other Object	0		2	0.26%	11	1.49%	13	0.86%
Road Maintenance Equipment	0		0	0.00%	0	0.00%	0	0.00%
Unknown Accident Type	0		5	0.65%	7	0.95%	12	0.80%
Total Fixed Objects	0		271	35.15%	189	25.61%	460	30.48%
Total Other Objects	0		2	0.26%	11	1.49%	13	0.86%

Montana Rural Mountainous 2-Lane Undivided Highways								
Description	0 - 0 ADT		0 - 1500 ADT		> 1500 ADT		All Totals	
	Accidents	Percent	Accidents	Percent	Accidents	Percent	Accidents	Percent
Lighting								
Daylight	0		482	62.52%	342	46.34%	824	54.61%
Dawn or Dusk	0		48	6.23%	78	10.57%	126	8.35%
Dark - Lighted	0		4	0.52%	10	1.36%	14	0.93%
Dark - Unlighted	0		235	30.48%	308	41.73%	543	35.98%
Unknown Lighting	0		2	0.26%	0	0.00%	2	0.13%
Weather								
No Adverse Weather	0		626	81.19%	604	81.84%	1,230	81.51%
Rain	0		27	3.50%	28	3.79%	55	3.64%
Snow or Sleet or Hail	0		103	13.36%	93	12.60%	196	12.99%
Fog	0		7	0.91%	8	1.08%	15	0.99%
Dust	0		0	0.00%	0	0.00%	0	0.00%
Wind	0		4	0.52%	3	0.41%	7	0.46%
Unknown Weather	0		4	0.52%	2	0.27%	6	0.40%
Road Condition								
Dry Road	0		480	62.26%	501	67.89%	981	65.01%
Wet Road	0		58	7.52%	66	8.94%	124	8.22%
Muddy Road	0		0	0.00%	1	0.14%	1	0.07%
Snowy Road	0		124	16.08%	80	10.84%	204	13.52%
Icy Road	0		98	12.71%	85	11.52%	183	12.13%
Slushy Road	0		0	0.00%	0	0.00%	0	0.00%
Foreign Material Road	0		0	0.00%	0	0.00%	0	0.00%
With Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Dry with Icy Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Wet with Icy Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Snowy with Icy Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Icy with Icy Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Slushy with Icy Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Unknown Road Condition	0		11	1.43%	5	0.68%	16	1.06%
Contributing Factor								
No Apparent Contributing Factor	0		120	15.56%	171	23.17%	291	19.28%
Asleep at the Wheel	0		7	0.91%	8	1.08%	15	0.99%
Illness	0		0	0.00%	0	0.00%	0	0.00%
Distracted by Passenger	0		0	0.00%	0	0.00%	0	0.00%
Driver Inexperience	0		0	0.00%	0	0.00%	0	0.00%
Driver Fatigue	0		0	0.00%	0	0.00%	0	0.00%
Driver Preoccupied	0		33	4.28%	16	2.17%	49	3.25%
Driver Unfamiliar with Area	0		0	0.00%	0	0.00%	0	0.00%
Driver Emotionally Upset	0		0	0.00%	0	0.00%	0	0.00%
Evading Law Enforcement Officer	0		0	0.00%	0	0.00%	0	0.00%
Physical Disability	0		0	0.00%	0	0.00%	0	0.00%
Unknown Contributing Factor	0		611	79.25%	543	73.58%	1,154	76.47%
Condition of Driver								
No Impairment Suspected	0		631	81.84%	650	88.08%	1,281	84.89%
Alcohol Involved	0		93	12.06%	51	6.91%	144	9.54%
RX Drugs or Medication Involved	0		0	0.00%	0	0.00%	0	0.00%
Illegal Drugs Involved	0		1	0.13%	3	0.41%	4	0.27%
Alcohol and Drugs Involved	0		13	1.69%	12	1.63%	25	1.66%
Driver/Pedestrian Not Observed	0		3	0.39%	3	0.41%	6	0.40%
Unknown Condition	0		30	3.89%	19	2.57%	49	3.25%
Total Accidents:	0		771	51.09%	738	48.91%	1,509	100.00%

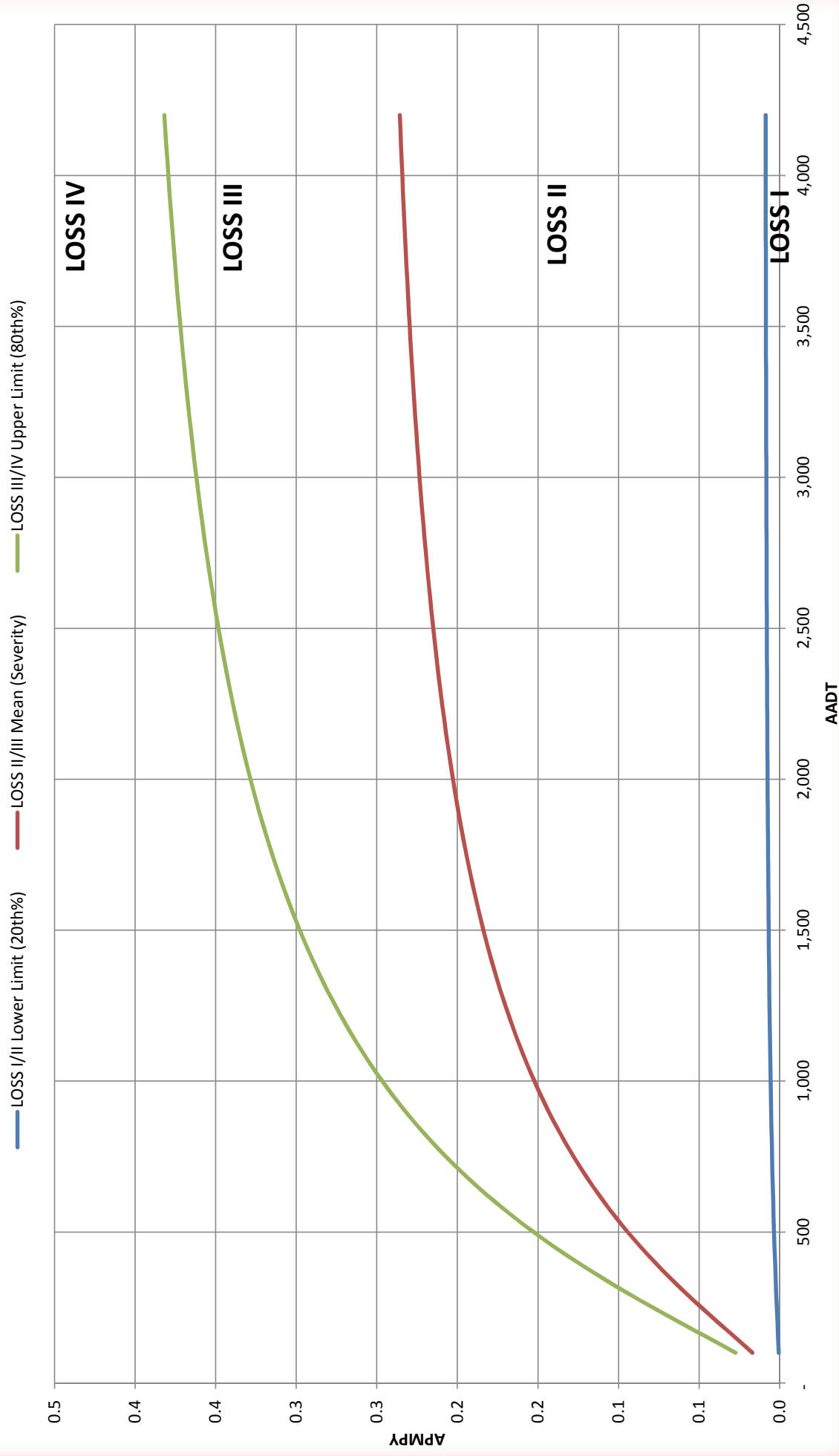


Montana Rural Mountainous 2-Lane UnDivided Highways (ROR)



SPF, LOSS, and Diagnostic Norms

SPF - Rural Mountainous 2-Lane UnDivided Highways (ROR)



Model:

SPF - Rural Mountainous 2-Lane UnDivided Highways (ROR)

Dispersion (Alpha) = 2.4193E+00

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
100	0.0006	0.0169	0.0274
150	0.0010	0.0275	0.0445
200	0.0014	0.0381	0.0618
250	0.0018	0.0486	0.0788
300	0.0022	0.0587	0.0951
350	0.0025	0.0684	0.1108
400	0.0029	0.0776	0.1256
450	0.0032	0.0862	0.1396
500	0.0035	0.0943	0.1528
550	0.0038	0.1019	0.1651
600	0.0041	0.1091	0.1767
650	0.0043	0.1158	0.1875
700	0.0045	0.1220	0.1977
750	0.0048	0.1279	0.2072
800	0.0050	0.1334	0.2161
850	0.0052	0.1386	0.2245
900	0.0053	0.1434	0.2323
950	0.0055	0.1480	0.2397
1,000	0.0057	0.1523	0.2466
1,050	0.0058	0.1563	0.2532
1,100	0.0060	0.1601	0.2593
1,150	0.0061	0.1637	0.2651
1,200	0.0062	0.1670	0.2706
1,250	0.0063	0.1702	0.2758
1,300	0.0065	0.1733	0.2806
1,350	0.0066	0.1761	0.2853
1,400	0.0067	0.1788	0.2897
1,450	0.0068	0.1814	0.2938
1,500	0.0068	0.1838	0.2978
1,550	0.0069	0.1862	0.3016
1,600	0.0070	0.1884	0.3051
1,650	0.0071	0.1905	0.3085
1,700	0.0072	0.1925	0.3118
1,750	0.0072	0.1944	0.3149
1,800	0.0073	0.1962	0.3178
1,850	0.0074	0.1980	0.3206
1,900	0.0074	0.1996	0.3233
1,950	0.0075	0.2012	0.3259
2,000	0.0075	0.2027	0.3284
2,050	0.0076	0.2042	0.3308
2,100	0.0077	0.2056	0.3330
2,150	0.0077	0.2069	0.3352
2,200	0.0078	0.2082	0.3373
2,250	0.0078	0.2095	0.3393

Model:

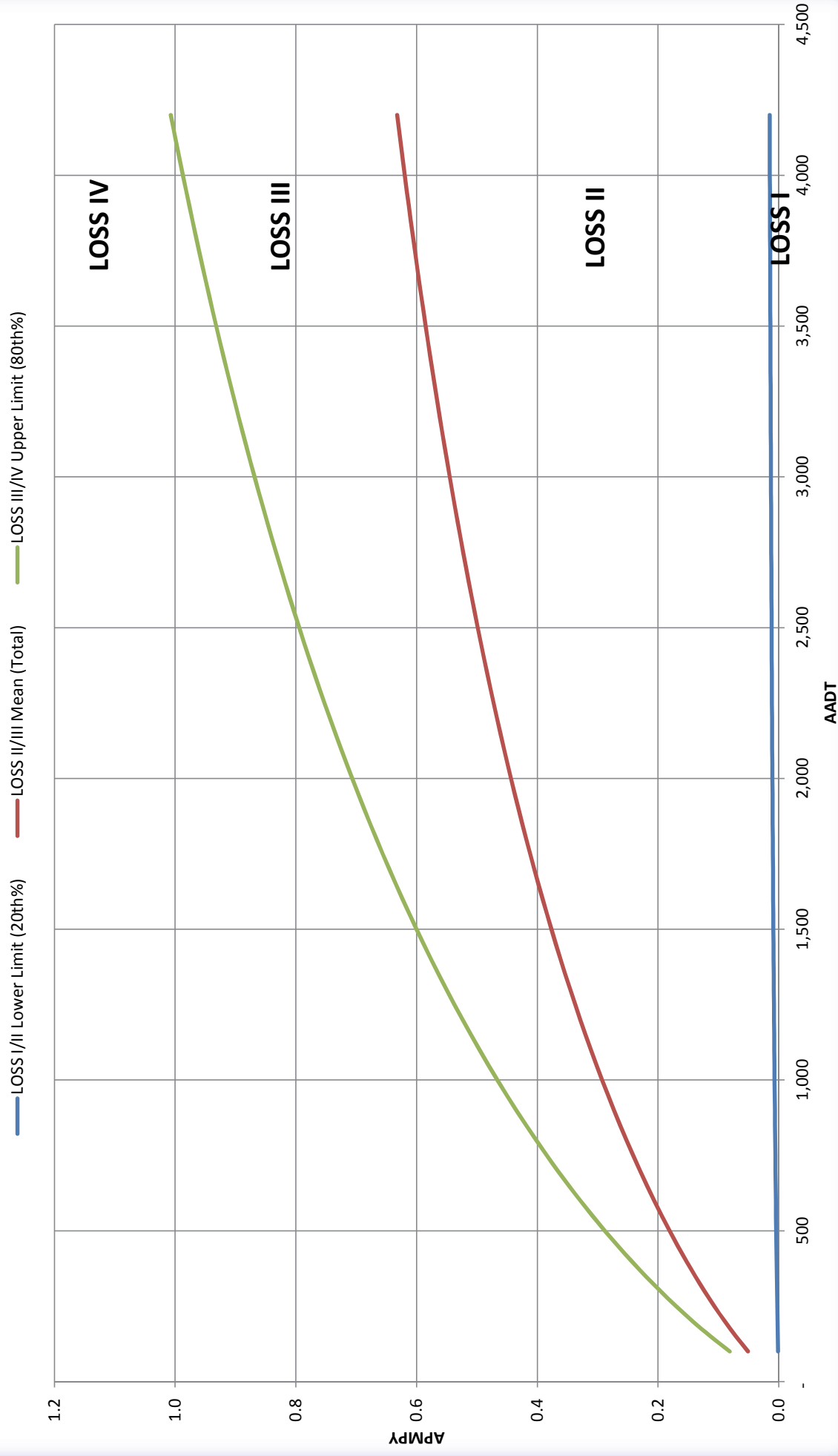
SPF - Rural Mountainous 2-Lane UnDivided Highways (ROR)

Dispersion (Alpha) = 2.4193E+00

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
2,300	0.0078	0.2107	0.3412
2,350	0.0079	0.2118	0.3431
2,400	0.0079	0.2129	0.3449
2,450	0.0080	0.2140	0.3466
2,500	0.0080	0.2150	0.3482
2,550	0.0080	0.2160	0.3498
2,600	0.0081	0.2169	0.3514
2,650	0.0081	0.2178	0.3529
2,700	0.0081	0.2187	0.3543
2,750	0.0082	0.2196	0.3557
2,800	0.0082	0.2204	0.3570
2,850	0.0082	0.2212	0.3583
2,900	0.0083	0.2220	0.3596
2,950	0.0083	0.2227	0.3608
3,000	0.0083	0.2234	0.3619
3,050	0.0083	0.2241	0.3631
3,100	0.0084	0.2248	0.3642
3,150	0.0084	0.2255	0.3652
3,200	0.0084	0.2261	0.3663
3,250	0.0084	0.2267	0.3673
3,300	0.0085	0.2273	0.3682
3,350	0.0085	0.2279	0.3692
3,400	0.0085	0.2285	0.3701
3,450	0.0085	0.2290	0.3710
3,500	0.0085	0.2296	0.3719
3,550	0.0086	0.2301	0.3727
3,600	0.0086	0.2306	0.3735
3,650	0.0086	0.2311	0.3743
3,700	0.0086	0.2316	0.3751
3,750	0.0086	0.2320	0.3759
3,800	0.0087	0.2325	0.3766
3,850	0.0087	0.2329	0.3773
3,900	0.0087	0.2334	0.3780
3,950	0.0087	0.2338	0.3787
4,000	0.0087	0.2342	0.3793
4,050	0.0087	0.2346	0.3800
4,100	0.0087	0.2350	0.3806
4,150	0.0088	0.2354	0.3812
4,200	0.0088	0.2357	0.3818



SPF - Rural Mountainous 2-Lane UnDivided Highways (ROR)



Model:

SPF - Rural Mountainous 2-Lane UnDivided Highways (ROR)

Dispersion (Alpha) = 2.7526E+00

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
100	0.0012	0.0510	0.0813
150	0.0017	0.0711	0.1132
200	0.0021	0.0896	0.1427
250	0.0026	0.1068	0.1702
300	0.0029	0.1231	0.1962
350	0.0033	0.1386	0.2208
400	0.0037	0.1533	0.2443
450	0.0040	0.1674	0.2667
500	0.0043	0.1809	0.2882
550	0.0046	0.1939	0.3089
600	0.0049	0.2064	0.3288
650	0.0052	0.2184	0.3480
700	0.0055	0.2301	0.3665
750	0.0058	0.2413	0.3845
800	0.0060	0.2522	0.4018
850	0.0063	0.2628	0.4186
900	0.0065	0.2730	0.4350
950	0.0068	0.2830	0.4508
1,000	0.0070	0.2927	0.4662
1,050	0.0072	0.3021	0.4812
1,100	0.0075	0.3112	0.4958
1,150	0.0077	0.3201	0.5100
1,200	0.0079	0.3288	0.5238
1,250	0.0081	0.3373	0.5373
1,300	0.0083	0.3456	0.5505
1,350	0.0085	0.3536	0.5633
1,400	0.0087	0.3615	0.5759
1,450	0.0088	0.3692	0.5881
1,500	0.0090	0.3767	0.6001
1,550	0.0092	0.3841	0.6118
1,600	0.0094	0.3912	0.6233
1,650	0.0095	0.3983	0.6345
1,700	0.0097	0.4052	0.6454
1,750	0.0099	0.4119	0.6562
1,800	0.0100	0.4185	0.6667
1,850	0.0102	0.4250	0.6770
1,900	0.0103	0.4313	0.6871
1,950	0.0105	0.4375	0.6970
2,000	0.0106	0.4436	0.7067
2,050	0.0108	0.4496	0.7162
2,100	0.0109	0.4554	0.7256
2,150	0.0110	0.4612	0.7347
2,200	0.0112	0.4669	0.7437
2,250	0.0113	0.4724	0.7526

Model:

SPF - Rural Mountainous 2-Lane UnDivided Highways (ROR)

Dispersion (Alpha) = 2.7526E+00

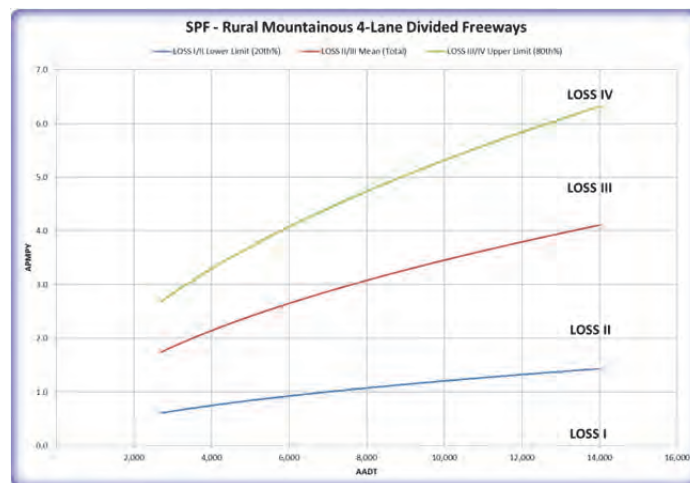
AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
2,300	0.0114	0.4778	0.7612
2,350	0.0116	0.4832	0.7698
2,400	0.0117	0.4885	0.7781
2,450	0.0118	0.4936	0.7864
2,500	0.0119	0.4987	0.7945
2,550	0.0121	0.5037	0.8024
2,600	0.0122	0.5086	0.8102
2,650	0.0123	0.5134	0.8179
2,700	0.0124	0.5182	0.8255
2,750	0.0125	0.5229	0.8329
2,800	0.0126	0.5275	0.8403
2,850	0.0127	0.5320	0.8475
2,900	0.0128	0.5364	0.8546
2,950	0.0129	0.5408	0.8615
3,000	0.0130	0.5451	0.8684
3,050	0.0132	0.5494	0.8752
3,100	0.0133	0.5536	0.8819
3,150	0.0134	0.5577	0.8885
3,200	0.0134	0.5618	0.8949
3,250	0.0135	0.5658	0.9013
3,300	0.0136	0.5697	0.9076
3,350	0.0137	0.5736	0.9138
3,400	0.0138	0.5775	0.9199
3,450	0.0139	0.5812	0.9259
3,500	0.0140	0.5850	0.9319
3,550	0.0141	0.5887	0.9378
3,600	0.0142	0.5923	0.9435
3,650	0.0143	0.5959	0.9492
3,700	0.0143	0.5994	0.9549
3,750	0.0144	0.6029	0.9604
3,800	0.0145	0.6063	0.9659
3,850	0.0146	0.6097	0.9713
3,900	0.0147	0.6131	0.9766
3,950	0.0148	0.6164	0.9819
4,000	0.0148	0.6196	0.9871
4,050	0.0149	0.6228	0.9922
4,100	0.0150	0.6260	0.9973
4,150	0.0151	0.6292	1.0023
4,200	0.0151	0.6323	1.0072

Montana Rural Mountainous 2-Lane Undivided Highways (ROR)								
Description	0 - 0 ADT		0 - 1500 ADT		> 1500 ADT		All Totals	
	Accidents	Percent	Accidents	Percent	Accidents	Percent	Accidents	Percent
Severity								
PDO	0		271	49.27%	210	62.31%	481	54.23%
INJ	0		260	47.27%	119	35.31%	379	42.73%
FAT	0		19	3.45%	8	2.37%	27	3.04%
Persons Injured	0		351	N/A	157	N/A	508	N/A
Persons Killed	0		20	N/A	9	N/A	29	N/A
Number of Vehicles								
Single Vehicle Accidents	0		517	94.00%	307	91.10%	824	92.90%
Two Vehicle Accidents	0		32	5.82%	30	8.90%	62	6.99%
Three or more Vehicle Accident	0		1	0.18%	0	0.00%	1	0.11%
Unknown Number of Vehicles	0		0	0.00%	0	0.00%	0	0.00%
Location								
On Road	0		161	29.27%	129	38.28%	290	32.69%
Off Road	0		286	52.00%	140	41.54%	426	48.03%
Off Road Left	0		117	21.27%	54	16.02%	171	19.28%
Off Road Right	0		169	30.73%	86	25.52%	255	28.75%
Off Road at Tee	0		0	0.00%	0	0.00%	0	0.00%
Off Road in Median	0		0	0.00%	0	0.00%	0	0.00%
Unknown Road Location	0		103	18.73%	68	20.18%	171	19.28%
Accident Type								
Overturning	0		246	44.73%	111	32.94%	357	40.25%
Other Non Collision	0		0	0.00%	0	0.00%	0	0.00%
School Age Pedestrians	0		0	0.00%	0	0.00%	0	0.00%
All Other Pedestrians	0		0	0.00%	0	0.00%	0	0.00%
Broadside	0		0	0.00%	0	0.00%	0	0.00%
Head On	0		12	2.18%	7	2.08%	19	2.14%
Rear End	0		0	0.00%	0	0.00%	0	0.00%
Sideswipe (Same Direction)	0		0	0.00%	0	0.00%	0	0.00%
Sideswipe (Opposite Direction)	0		19	3.45%	19	5.64%	38	4.28%
Approach Turn	0		0	0.00%	0	0.00%	0	0.00%
Overtaking Turn	0		0	0.00%	0	0.00%	0	0.00%
Parked Motor Vehicle	0		0	0.00%	0	0.00%	0	0.00%
Railway Vehicle	0		0	0.00%	0	0.00%	0	0.00%
Bicycle	0		0	0.00%	0	0.00%	0	0.00%
Motorized Bicycle	0		0	0.00%	0	0.00%	0	0.00%
Domestic Animal	0		0	0.00%	0	0.00%	0	0.00%
Wild Animal	0		0	0.00%	0	0.00%	0	0.00%
Light or Utility Pole	0		6	1.09%	2	0.59%	8	0.90%
Traffic Signal Pole	0		0	0.00%	0	0.00%	0	0.00%
Sign	0		1	0.18%	7	2.08%	8	0.90%
Bridge Rail	0		2	0.36%	1	0.30%	3	0.34%
Guard Rail	0		55	10.00%	50	14.84%	105	11.84%
Cable Rail	0		0	0.00%	0	0.00%	0	0.00%
Median Barrier	0		3	0.55%	4	1.19%	7	0.79%
Bridge Abutment	0		0	0.00%	0	0.00%	0	0.00%
Column or Pier	0		0	0.00%	0	0.00%	0	0.00%
Culvert or Headwall	0		4	0.73%	3	0.89%	7	0.79%
Embankment	0		83	15.09%	47	13.95%	130	14.66%
Curb	0		0	0.00%	0	0.00%	0	0.00%
Delineator Post	0		0	0.00%	0	0.00%	0	0.00%
Fence	0		10	1.82%	21	6.23%	31	3.49%
Tree	0		71	12.91%	26	7.72%	97	10.94%
Large Boulder	0		15	2.73%	4	1.19%	19	2.14%
Rocks in Roadway	0		0	0.00%	0	0.00%	0	0.00%
Barricade	0		0	0.00%	0	0.00%	0	0.00%
Wall or Building	0		0	0.00%	0	0.00%	0	0.00%
Crash Cushion	0		0	0.00%	1	0.30%	1	0.11%
Mailbox	0		1	0.18%	1	0.30%	2	0.23%
Other Fixed Object	0		20	3.64%	22	6.53%	42	4.74%
Involving Other Object	0		2	0.36%	11	3.26%	13	1.47%
Road Maintenance Equipment	0		0	0.00%	0	0.00%	0	0.00%
Unknown Accident Type	0		0	0.00%	0	0.00%	0	0.00%
Total Fixed Objects	0		271	49.27%	189	56.08%	460	51.86%
Total Other Objects	0		2	0.36%	11	3.26%	13	1.47%

Montana Rural Mountainous 2-Lane Undivided Highways (ROR)								
Description	0 - 0 ADT		0 - 1500 ADT		> 1500 ADT		All Totals	
	Accidents	Percent	Accidents	Percent	Accidents	Percent	Accidents	Percent
Lighting								
Daylight	0		367	66.73%	187	55.49%	554	62.46%
Dawn or Dusk	0		25	4.55%	21	6.23%	46	5.19%
Dark - Lighted	0		0	0.00%	4	1.19%	4	0.45%
Dark - Unlighted	0		157	28.55%	125	37.09%	282	31.79%
Unknown Lighting	0		1	0.18%	0	0.00%	1	0.11%
Weather								
No Adverse Weather	0		426	77.45%	242	71.81%	668	75.31%
Rain	0		21	3.82%	18	5.34%	39	4.40%
Snow or Sleet or Hail	0		93	16.91%	71	21.07%	164	18.49%
Fog	0		5	0.91%	3	0.89%	8	0.90%
Dust	0		0	0.00%	0	0.00%	0	0.00%
Wind	0		2	0.36%	1	0.30%	3	0.34%
Unknown Weather	0		3	0.55%	2	0.59%	5	0.56%
Road Condition								
Dry Road	0		303	55.09%	162	48.07%	465	52.42%
Wet Road	0		36	6.55%	33	9.79%	69	7.78%
Muddy Road	0		0	0.00%	1	0.30%	1	0.11%
Snowy Road	0		112	20.36%	63	18.69%	175	19.73%
Icy Road	0		92	16.73%	74	21.96%	166	18.71%
Slushy Road	0		0	0.00%	0	0.00%	0	0.00%
Foreign Material Road	0		0	0.00%	0	0.00%	0	0.00%
With Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Dry with Icy Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Wet with Icy Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Snowy with Icy Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Icy with Icy Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Slushy with Icy Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Unknown Road Condition	0		7	1.27%	4	1.19%	11	1.24%
Contributing Factor								
No Apparent Contributing Factor	0		48	8.73%	25	7.42%	73	8.23%
Asleep at the Wheel	0		7	1.27%	8	2.37%	15	1.69%
Illness	0		0	0.00%	0	0.00%	0	0.00%
Distracted by Passenger	0		0	0.00%	0	0.00%	0	0.00%
Driver Inexperience	0		0	0.00%	0	0.00%	0	0.00%
Driver Fatigue	0		0	0.00%	0	0.00%	0	0.00%
Driver Preoccupied	0		32	5.82%	10	2.97%	42	4.74%
Driver Unfamiliar with Area	0		0	0.00%	0	0.00%	0	0.00%
Driver Emotionally Upset	0		0	0.00%	0	0.00%	0	0.00%
Evading Law Enforcement Officer	0		0	0.00%	0	0.00%	0	0.00%
Physical Disability	0		0	0.00%	0	0.00%	0	0.00%
Unknown Contributing Factor	0		463	84.18%	294	87.24%	757	85.34%
Condition of Driver								
No Impairment Suspected	0		421	76.55%	266	78.93%	687	77.45%
Alcohol Involved	0		88	16.00%	45	13.35%	133	14.99%
RX Drugs or Medication Involved	0		0	0.00%	0	0.00%	0	0.00%
Illegal Drugs Involved	0		1	0.18%	2	0.59%	3	0.34%
Alcohol and Drugs Involved	0		12	2.18%	12	3.56%	24	2.71%
Driver/Pedestrian Not Observed	0		3	0.55%	0	0.00%	3	0.34%
Unknown Condition	0		25	4.55%	12	3.56%	37	4.17%
Total Accidents:	0		550	62.01%	337	37.99%	887	100.00%

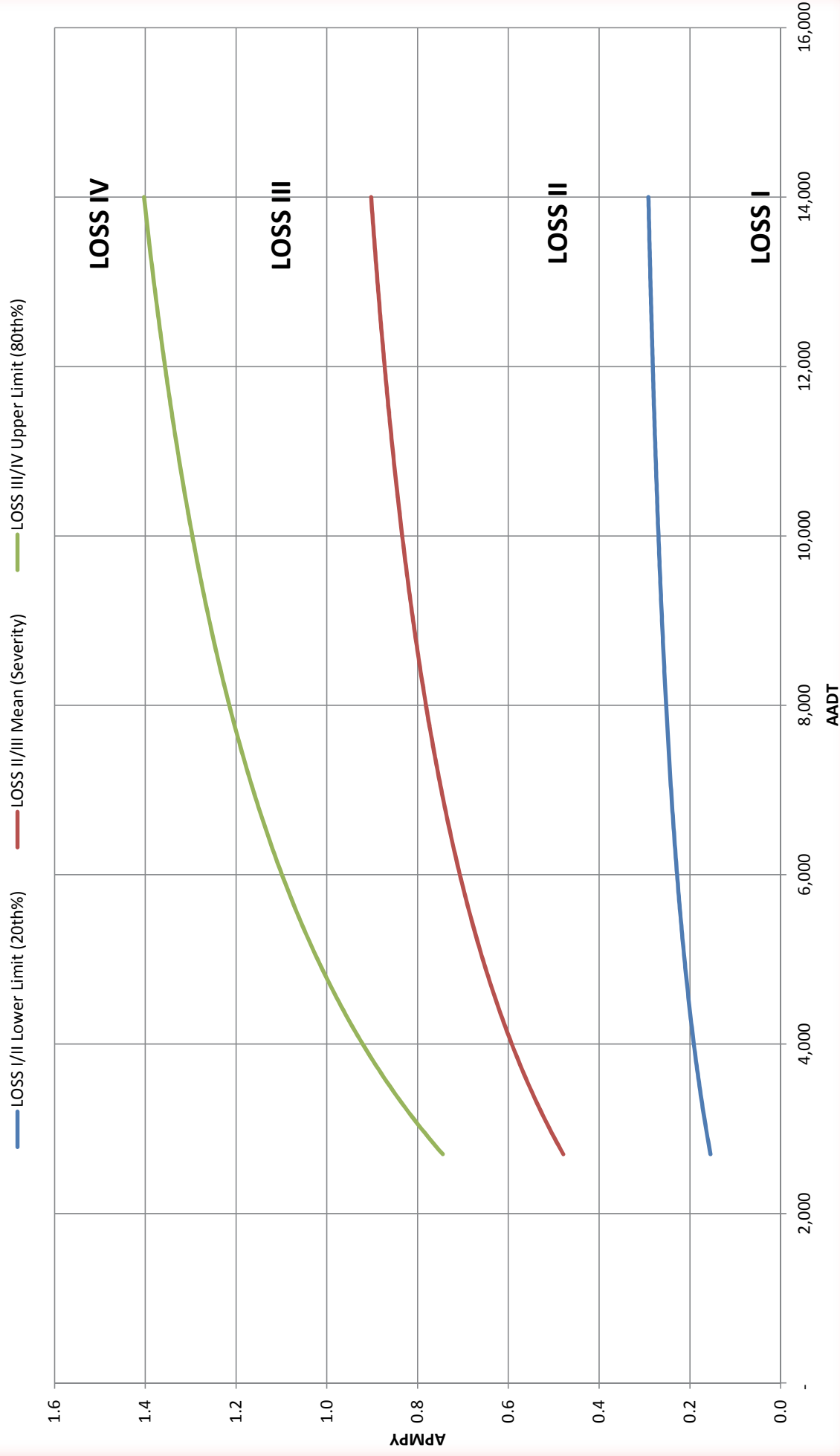


Montana Rural Mountainous 4-Lane Divided Freeways



SPF, LOSS, and Diagnostic Norms

SPF - Rural Mountainous 4-Lane Divided Freeways



Model:

SPF - Rural Mountainous 4-Lane Divided Freeways

Dispersion (Alpha) = 6.9674E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
2,700	0.1546	0.4789	0.7445
2,750	0.1563	0.4841	0.7526
2,800	0.1580	0.4893	0.7606
2,850	0.1596	0.4943	0.7685
2,900	0.1612	0.4993	0.7762
2,950	0.1628	0.5042	0.7839
3,000	0.1644	0.5090	0.7914
3,050	0.1659	0.5138	0.7988
3,100	0.1674	0.5185	0.8061
3,150	0.1689	0.5231	0.8132
3,200	0.1704	0.5277	0.8203
3,250	0.1718	0.5321	0.8273
3,300	0.1733	0.5366	0.8342
3,350	0.1747	0.5409	0.8409
3,400	0.1761	0.5452	0.8476
3,450	0.1774	0.5495	0.8542
3,500	0.1788	0.5536	0.8607
3,550	0.1801	0.5577	0.8671
3,600	0.1814	0.5618	0.8734
3,650	0.1827	0.5658	0.8796
3,700	0.1840	0.5698	0.8858
3,750	0.1852	0.5737	0.8918
3,800	0.1865	0.5775	0.8978
3,850	0.1877	0.5813	0.9037
3,900	0.1889	0.5850	0.9095
3,950	0.1901	0.5887	0.9153
4,000	0.1913	0.5924	0.9209
4,050	0.1924	0.5960	0.9265
4,100	0.1936	0.5995	0.9320
4,150	0.1947	0.6030	0.9375
4,200	0.1958	0.6065	0.9428
4,250	0.1969	0.6099	0.9481
4,300	0.1980	0.6133	0.9534
4,350	0.1991	0.6166	0.9586
4,400	0.2002	0.6199	0.9637
4,450	0.2012	0.6231	0.9687
4,500	0.2022	0.6263	0.9737
4,550	0.2033	0.6295	0.9786
4,600	0.2043	0.6326	0.9835
4,650	0.2053	0.6357	0.9883
4,700	0.2063	0.6387	0.9930
4,750	0.2072	0.6418	0.9977
4,800	0.2082	0.6447	1.0023
4,850	0.2091	0.6477	1.0069

Model:

SPF - Rural Mountainous 4-Lane Divided Freeways

Dispersion (Alpha) = 6.9674E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
4,900	0.2101	0.6506	1.0114
4,950	0.2110	0.6535	1.0159
5,000	0.2119	0.6563	1.0203
5,050	0.2128	0.6591	1.0247
5,100	0.2137	0.6619	1.0290
5,150	0.2146	0.6646	1.0332
5,200	0.2155	0.6673	1.0374
5,250	0.2164	0.6700	1.0416
5,300	0.2172	0.6727	1.0457
5,350	0.2181	0.6753	1.0498
5,400	0.2189	0.6779	1.0538
5,450	0.2197	0.6804	1.0578
5,500	0.2205	0.6830	1.0617
5,550	0.2213	0.6855	1.0656
5,600	0.2221	0.6879	1.0695
5,650	0.2229	0.6904	1.0733
5,700	0.2237	0.6928	1.0771
5,750	0.2245	0.6952	1.0808
5,800	0.2253	0.6976	1.0845
5,850	0.2260	0.6999	1.0881
5,900	0.2268	0.7022	1.0917
5,950	0.2275	0.7045	1.0953
6,000	0.2282	0.7068	1.0988
6,050	0.2290	0.7091	1.1023
6,100	0.2297	0.7113	1.1058
6,150	0.2304	0.7135	1.1092
6,200	0.2311	0.7157	1.1126
6,250	0.2318	0.7178	1.1159
6,300	0.2325	0.7200	1.1193
6,350	0.2332	0.7221	1.1225
6,400	0.2338	0.7242	1.1258
6,450	0.2345	0.7262	1.1290
6,500	0.2352	0.7283	1.1322
6,550	0.2358	0.7303	1.1354
6,600	0.2365	0.7323	1.1385
6,650	0.2371	0.7343	1.1416
6,700	0.2378	0.7363	1.1446
6,750	0.2384	0.7382	1.1477
6,800	0.2390	0.7402	1.1507
6,850	0.2396	0.7421	1.1536
6,900	0.2402	0.7440	1.1566
6,950	0.2408	0.7458	1.1595
7,000	0.2414	0.7477	1.1624
7,050	0.2420	0.7495	1.1652

Model:

SPF - Rural Mountainous 4-Lane Divided Freeways

Dispersion (Alpha) = 6.9674E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
7,100	0.2426	0.7514	1.1681
7,150	0.2432	0.7532	1.1709
7,200	0.2438	0.7549	1.1737
7,250	0.2444	0.7567	1.1764
7,300	0.2449	0.7585	1.1791
7,350	0.2455	0.7602	1.1819
7,400	0.2460	0.7619	1.1845
7,450	0.2466	0.7636	1.1872
7,500	0.2471	0.7653	1.1898
7,550	0.2477	0.7670	1.1924
7,600	0.2482	0.7687	1.1950
7,650	0.2487	0.7703	1.1976
7,700	0.2493	0.7719	1.2001
7,750	0.2498	0.7736	1.2026
7,800	0.2503	0.7752	1.2051
7,850	0.2508	0.7768	1.2076
7,900	0.2513	0.7783	1.2100
7,950	0.2518	0.7799	1.2124
8,000	0.2523	0.7814	1.2148
8,050	0.2528	0.7830	1.2172
8,100	0.2533	0.7845	1.2196
8,150	0.2538	0.7860	1.2219
8,200	0.2543	0.7875	1.2243
8,250	0.2548	0.7890	1.2266
8,300	0.2552	0.7904	1.2288
8,350	0.2557	0.7919	1.2311
8,400	0.2562	0.7933	1.2333
8,450	0.2566	0.7948	1.2356
8,500	0.2571	0.7962	1.2378
8,550	0.2576	0.7976	1.2400
8,600	0.2580	0.7990	1.2421
8,650	0.2585	0.8004	1.2443
8,700	0.2589	0.8017	1.2464
8,750	0.2593	0.8031	1.2485
8,800	0.2598	0.8045	1.2506
8,850	0.2602	0.8058	1.2527
8,900	0.2606	0.8071	1.2548
8,950	0.2611	0.8084	1.2568
9,000	0.2615	0.8097	1.2588
9,050	0.2619	0.8110	1.2609
9,100	0.2623	0.8123	1.2629
9,150	0.2627	0.8136	1.2648
9,200	0.2631	0.8149	1.2668
9,250	0.2635	0.8161	1.2688

Model:

SPF - Rural Mountainous 4-Lane Divided Freeways

Dispersion (Alpha) = 6.9674E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
9,300	0.2639	0.8174	1.2707
9,350	0.2643	0.8186	1.2726
9,400	0.2647	0.8198	1.2745
9,450	0.2651	0.8210	1.2764
9,500	0.2655	0.8222	1.2783
9,550	0.2659	0.8234	1.2801
9,600	0.2663	0.8246	1.2820
9,650	0.2667	0.8258	1.2838
9,700	0.2670	0.8270	1.2856
9,750	0.2674	0.8281	1.2875
9,800	0.2678	0.8293	1.2892
9,850	0.2682	0.8304	1.2910
9,900	0.2685	0.8316	1.2928
9,950	0.2689	0.8327	1.2945
10,000	0.2693	0.8338	1.2963
10,050	0.2696	0.8349	1.2980
10,100	0.2700	0.8360	1.2997
10,150	0.2703	0.8371	1.3014
10,200	0.2707	0.8382	1.3031
10,250	0.2710	0.8393	1.3048
10,300	0.2714	0.8404	1.3064
10,350	0.2717	0.8414	1.3081
10,400	0.2720	0.8425	1.3097
10,450	0.2724	0.8435	1.3113
10,500	0.2727	0.8445	1.3130
10,550	0.2731	0.8456	1.3146
10,600	0.2734	0.8466	1.3162
10,650	0.2737	0.8476	1.3177
10,700	0.2740	0.8486	1.3193
10,750	0.2744	0.8496	1.3209
10,800	0.2747	0.8506	1.3224
10,850	0.2750	0.8516	1.3239
10,900	0.2753	0.8526	1.3255
10,950	0.2756	0.8536	1.3270
11,000	0.2759	0.8545	1.3285
11,050	0.2763	0.8555	1.3300
11,100	0.2766	0.8564	1.3315
11,150	0.2769	0.8574	1.3329
11,200	0.2772	0.8583	1.3344
11,250	0.2775	0.8593	1.3359
11,300	0.2778	0.8602	1.3373
11,350	0.2781	0.8611	1.3387
11,400	0.2784	0.8620	1.3401
11,450	0.2787	0.8629	1.3416

Model:

SPF - Rural Mountainous 4-Lane Divided Freeways

Dispersion (Alpha) = 6.9674E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
11,500	0.2789	0.8638	1.3430
11,550	0.2792	0.8647	1.3444
11,600	0.2795	0.8656	1.3457
11,650	0.2798	0.8665	1.3471
11,700	0.2801	0.8674	1.3485
11,750	0.2804	0.8683	1.3498
11,800	0.2807	0.8691	1.3512
11,850	0.2809	0.8700	1.3525
11,900	0.2812	0.8709	1.3539
11,950	0.2815	0.8717	1.3552
12,000	0.2818	0.8726	1.3565
12,050	0.2820	0.8734	1.3578
12,100	0.2823	0.8742	1.3591
12,150	0.2826	0.8751	1.3604
12,200	0.2828	0.8759	1.3617
12,250	0.2831	0.8767	1.3629
12,300	0.2834	0.8775	1.3642
12,350	0.2836	0.8783	1.3655
12,400	0.2839	0.8791	1.3667
12,450	0.2841	0.8799	1.3679
12,500	0.2844	0.8807	1.3692
12,550	0.2846	0.8815	1.3704
12,600	0.2849	0.8823	1.3716
12,650	0.2851	0.8830	1.3728
12,700	0.2854	0.8838	1.3740
12,750	0.2856	0.8846	1.3752
12,800	0.2859	0.8854	1.3764
12,850	0.2861	0.8861	1.3776
12,900	0.2864	0.8869	1.3787
12,950	0.2866	0.8876	1.3799
13,000	0.2869	0.8884	1.3811
13,050	0.2871	0.8891	1.3822
13,100	0.2873	0.8898	1.3834
13,150	0.2876	0.8906	1.3845
13,200	0.2878	0.8913	1.3856
13,250	0.2880	0.8920	1.3867
13,300	0.2883	0.8927	1.3879
13,350	0.2885	0.8934	1.3890
13,400	0.2887	0.8941	1.3901
13,450	0.2890	0.8949	1.3912
13,500	0.2892	0.8956	1.3923
13,550	0.2894	0.8962	1.3933
13,600	0.2896	0.8969	1.3944
13,650	0.2899	0.8976	1.3955

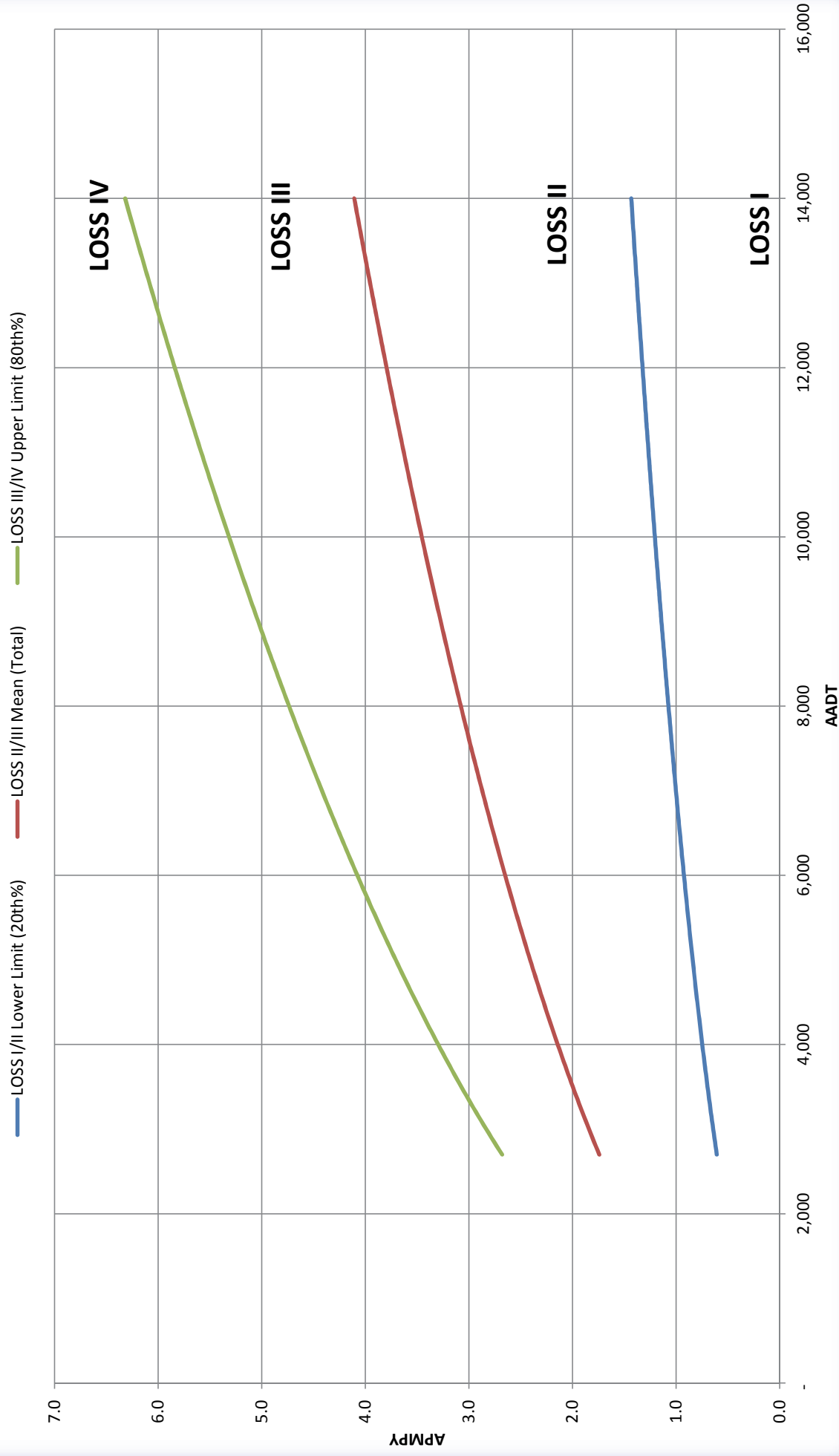
Model:

SPF - Rural Mountainous 4-Lane Divided Freeways

Dispersion (Alpha) = 6.9674E-01

<u>AADT</u>	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
13,700	0.2901	0.8983	1.3965
13,750	0.2903	0.8990	1.3976
13,800	0.2905	0.8997	1.3986
13,850	0.2907	0.9003	1.3997
13,900	0.2909	0.9010	1.4007
13,950	0.2912	0.9017	1.4018
14,000	0.2914	0.9023	1.4028

SPF - Rural Mountainous 4-Lane Divided Freeways



Model:

SPF - Rural Mountainous 4-Lane Divided Freeways

Dispersion (Alpha) = 6.3384E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
2,700	0.6075	1.7414	2.6794
2,750	0.6135	1.7584	2.7055
2,800	0.6193	1.7752	2.7314
2,850	0.6252	1.7919	2.7570
2,900	0.6309	1.8084	2.7825
2,950	0.6366	1.8248	2.8077
3,000	0.6423	1.8411	2.8327
3,050	0.6480	1.8572	2.8576
3,100	0.6535	1.8733	2.8822
3,150	0.6591	1.8891	2.9066
3,200	0.6646	1.9049	2.9309
3,250	0.6700	1.9205	2.9549
3,300	0.6755	1.9361	2.9788
3,350	0.6808	1.9515	3.0026
3,400	0.6862	1.9668	3.0261
3,450	0.6915	1.9820	3.0495
3,500	0.6967	1.9971	3.0727
3,550	0.7020	2.0120	3.0957
3,600	0.7071	2.0269	3.1186
3,650	0.7123	2.0417	3.1414
3,700	0.7174	2.0564	3.1639
3,750	0.7225	2.0710	3.1864
3,800	0.7276	2.0854	3.2087
3,850	0.7326	2.0998	3.2308
3,900	0.7376	2.1141	3.2528
3,950	0.7425	2.1284	3.2747
4,000	0.7475	2.1425	3.2964
4,050	0.7524	2.1565	3.3180
4,100	0.7572	2.1705	3.3395
4,150	0.7621	2.1844	3.3609
4,200	0.7669	2.1982	3.3821
4,250	0.7717	2.2119	3.4032
4,300	0.7764	2.2255	3.4242
4,350	0.7812	2.2391	3.4450
4,400	0.7859	2.2525	3.4657
4,450	0.7905	2.2659	3.4864
4,500	0.7952	2.2793	3.5069
4,550	0.7998	2.2925	3.5273
4,600	0.8044	2.3057	3.5476
4,650	0.8090	2.3188	3.5677
4,700	0.8135	2.3319	3.5878
4,750	0.8181	2.3448	3.6078
4,800	0.8226	2.3578	3.6276
4,850	0.8270	2.3706	3.6474

Model:

SPF - Rural Mountainous 4-Lane Divided Freeways

Dispersion (Alpha) = 6.3384E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
4,900	0.8315	2.3834	3.6671
4,950	0.8359	2.3961	3.6866
5,000	0.8404	2.4088	3.7061
5,050	0.8448	2.4213	3.7255
5,100	0.8491	2.4339	3.7448
5,150	0.8535	2.4463	3.7639
5,200	0.8578	2.4587	3.7830
5,250	0.8621	2.4711	3.8020
5,300	0.8664	2.4834	3.8209
5,350	0.8707	2.4956	3.8398
5,400	0.8749	2.5078	3.8585
5,450	0.8791	2.5199	3.8772
5,500	0.8834	2.5320	3.8957
5,550	0.8875	2.5440	3.9142
5,600	0.8917	2.5560	3.9326
5,650	0.8959	2.5679	3.9509
5,700	0.9000	2.5797	3.9692
5,750	0.9041	2.5915	3.9873
5,800	0.9082	2.6033	4.0054
5,850	0.9123	2.6150	4.0234
5,900	0.9164	2.6266	4.0413
5,950	0.9204	2.6382	4.0592
6,000	0.9245	2.6498	4.0770
6,050	0.9285	2.6613	4.0947
6,100	0.9325	2.6728	4.1123
6,150	0.9364	2.6842	4.1299
6,200	0.9404	2.6955	4.1474
6,250	0.9444	2.7069	4.1648
6,300	0.9483	2.7181	4.1821
6,350	0.9522	2.7294	4.1994
6,400	0.9561	2.7406	4.2166
6,450	0.9600	2.7517	4.2338
6,500	0.9639	2.7628	4.2508
6,550	0.9677	2.7739	4.2679
6,600	0.9716	2.7849	4.2848
6,650	0.9754	2.7959	4.3017
6,700	0.9792	2.8068	4.3185
6,750	0.9830	2.8177	4.3353
6,800	0.9868	2.8285	4.3520
6,850	0.9906	2.8393	4.3686
6,900	0.9943	2.8501	4.3852
6,950	0.9981	2.8609	4.4017
7,000	1.0018	2.8715	4.4182
7,050	1.0055	2.8822	4.4346

Model:

SPF - Rural Mountainous 4-Lane Divided Freeways

Dispersion (Alpha) = 6.3384E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
7,100	1.0092	2.8928	4.4509
7,150	1.0129	2.9034	4.4672
7,200	1.0166	2.9140	4.4834
7,250	1.0203	2.9245	4.4996
7,300	1.0239	2.9349	4.5157
7,350	1.0276	2.9454	4.5317
7,400	1.0312	2.9558	4.5477
7,450	1.0348	2.9661	4.5637
7,500	1.0384	2.9765	4.5796
7,550	1.0420	2.9868	4.5954
7,600	1.0456	2.9970	4.6112
7,650	1.0492	3.0073	4.6270
7,700	1.0527	3.0174	4.6426
7,750	1.0563	3.0276	4.6583
7,800	1.0598	3.0377	4.6739
7,850	1.0633	3.0478	4.6894
7,900	1.0668	3.0579	4.7049
7,950	1.0703	3.0679	4.7203
8,000	1.0738	3.0779	4.7357
8,050	1.0773	3.0879	4.7510
8,100	1.0808	3.0978	4.7663
8,150	1.0842	3.1077	4.7816
8,200	1.0877	3.1176	4.7967
8,250	1.0911	3.1275	4.8119
8,300	1.0945	3.1373	4.8270
8,350	1.0979	3.1470	4.8421
8,400	1.1013	3.1568	4.8571
8,450	1.1047	3.1665	4.8720
8,500	1.1081	3.1762	4.8869
8,550	1.1115	3.1859	4.9018
8,600	1.1148	3.1955	4.9166
8,650	1.1182	3.2051	4.9314
8,700	1.1215	3.2147	4.9462
8,750	1.1249	3.2243	4.9609
8,800	1.1282	3.2338	4.9755
8,850	1.1315	3.2433	4.9902
8,900	1.1348	3.2528	5.0047
8,950	1.1381	3.2622	5.0193
9,000	1.1414	3.2716	5.0338
9,050	1.1447	3.2810	5.0482
9,100	1.1479	3.2904	5.0626
9,150	1.1512	3.2997	5.0770
9,200	1.1545	3.3091	5.0913
9,250	1.1577	3.3184	5.1056

Model:

SPF - Rural Mountainous 4-Lane Divided Freeways

Dispersion (Alpha) = 6.3384E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
9,300	1.1609	3.3276	5.1199
9,350	1.1642	3.3369	5.1341
9,400	1.1674	3.3461	5.1483
9,450	1.1706	3.3553	5.1624
9,500	1.1738	3.3644	5.1765
9,550	1.1770	3.3736	5.1905
9,600	1.1801	3.3827	5.2046
9,650	1.1833	3.3918	5.2186
9,700	1.1865	3.4008	5.2325
9,750	1.1896	3.4099	5.2464
9,800	1.1928	3.4189	5.2603
9,850	1.1959	3.4279	5.2741
9,900	1.1990	3.4369	5.2879
9,950	1.2022	3.4458	5.3017
10,000	1.2053	3.4547	5.3154
10,050	1.2084	3.4636	5.3291
10,100	1.2115	3.4725	5.3428
10,150	1.2146	3.4814	5.3564
10,200	1.2177	3.4902	5.3700
10,250	1.2207	3.4990	5.3836
10,300	1.2238	3.5078	5.3971
10,350	1.2269	3.5166	5.4106
10,400	1.2299	3.5253	5.4241
10,450	1.2330	3.5341	5.4375
10,500	1.2360	3.5428	5.4509
10,550	1.2390	3.5514	5.4643
10,600	1.2420	3.5601	5.4776
10,650	1.2451	3.5688	5.4909
10,700	1.2481	3.5774	5.5041
10,750	1.2511	3.5860	5.5174
10,800	1.2541	3.5946	5.5306
10,850	1.2570	3.6031	5.5438
10,900	1.2600	3.6117	5.5569
10,950	1.2630	3.6202	5.5700
11,000	1.2660	3.6287	5.5831
11,050	1.2689	3.6372	5.5961
11,100	1.2719	3.6456	5.6091
11,150	1.2748	3.6541	5.6221
11,200	1.2778	3.6625	5.6351
11,250	1.2807	3.6709	5.6480
11,300	1.2836	3.6793	5.6609
11,350	1.2865	3.6876	5.6738
11,400	1.2894	3.6960	5.6866
11,450	1.2923	3.7043	5.6994

Model:

SPF - Rural Mountainous 4-Lane Divided Freeways

Dispersion (Alpha) = 6.3384E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
11,500	1.2952	3.7126	5.7122
11,550	1.2981	3.7209	5.7250
11,600	1.3010	3.7292	5.7377
11,650	1.3039	3.7374	5.7504
11,700	1.3068	3.7457	5.7631
11,750	1.3096	3.7539	5.7757
11,800	1.3125	3.7621	5.7883
11,850	1.3154	3.7702	5.8009
11,900	1.3182	3.7784	5.8135
11,950	1.3210	3.7866	5.8260
12,000	1.3239	3.7947	5.8385
12,050	1.3267	3.8028	5.8510
12,100	1.3295	3.8109	5.8634
12,150	1.3323	3.8190	5.8759
12,200	1.3352	3.8270	5.8883
12,250	1.3380	3.8351	5.9006
12,300	1.3408	3.8431	5.9130
12,350	1.3436	3.8511	5.9253
12,400	1.3463	3.8591	5.9376
12,450	1.3491	3.8671	5.9498
12,500	1.3519	3.8750	5.9621
12,550	1.3547	3.8830	5.9743
12,600	1.3574	3.8909	5.9865
12,650	1.3602	3.8988	5.9987
12,700	1.3629	3.9067	6.0108
12,750	1.3657	3.9146	6.0229
12,800	1.3684	3.9224	6.0350
12,850	1.3712	3.9303	6.0471
12,900	1.3739	3.9381	6.0591
12,950	1.3766	3.9459	6.0712
13,000	1.3794	3.9537	6.0832
13,050	1.3821	3.9615	6.0951
13,100	1.3848	3.9692	6.1071
13,150	1.3875	3.9770	6.1190
13,200	1.3902	3.9847	6.1309
13,250	1.3929	3.9924	6.1428
13,300	1.3956	4.0002	6.1546
13,350	1.3982	4.0078	6.1665
13,400	1.4009	4.0155	6.1783
13,450	1.4036	4.0232	6.1901
13,500	1.4063	4.0308	6.2018
13,550	1.4089	4.0385	6.2136
13,600	1.4116	4.0461	6.2253
13,650	1.4142	4.0537	6.2370

Model:

SPF - Rural Mountainous 4-Lane Divided Freeways

Dispersion (Alpha) = 6.3384E-01

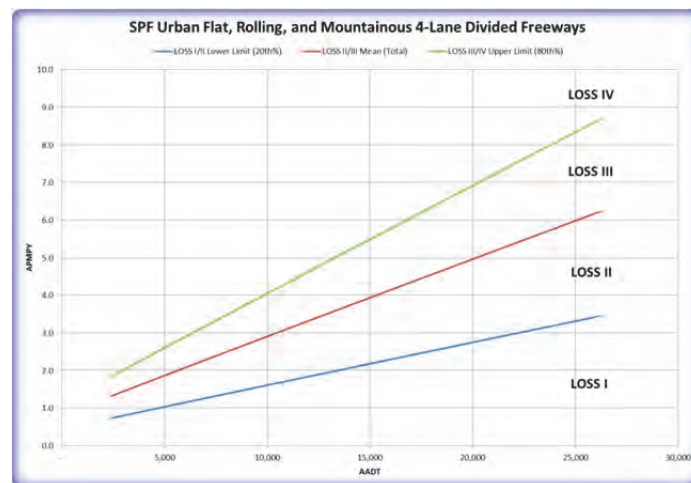
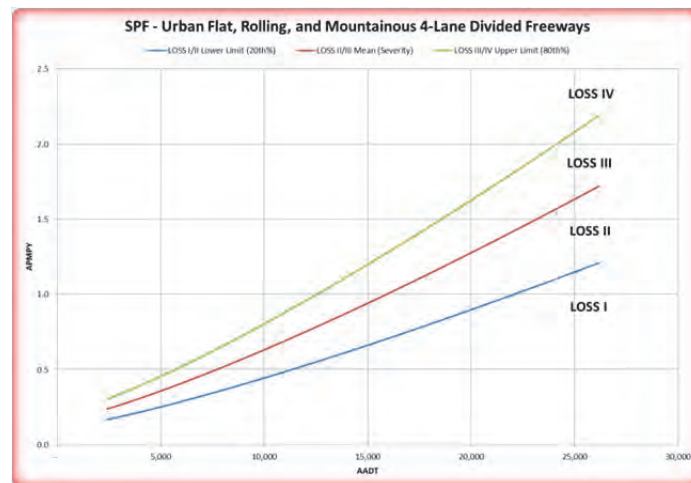
<u>AADT</u>	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
13,700	1.4169	4.0613	6.2486
13,750	1.4195	4.0688	6.2603
13,800	1.4222	4.0764	6.2719
13,850	1.4248	4.0839	6.2835
13,900	1.4274	4.0915	6.2951
13,950	1.4300	4.0990	6.3067
14,000	1.4327	4.1065	6.3182

Montana Rural Mountainous 4-Lane Divided Freeways								
Description	0 - 0 ADT		0 - 8000 ADT		> 8000 ADT		All Totals	
	Accidents	Percent	Accidents	Percent	Accidents	Percent	Accidents	Percent
Severity								
PDO	0		1,289	73.45%	613	76.05%	1,902	74.27%
INJ	0		445	25.36%	189	23.45%	634	24.76%
FAT	0		21	1.20%	4	0.50%	25	0.98%
Persons Injured	0		597	N/A	299	N/A	896	N/A
Persons Killed	0		21	N/A	6	N/A	27	N/A
Number of Vehicles								
Single Vehicle Accidents	0		1,556	88.66%	683	84.74%	2,239	87.43%
Two Vehicle Accidents	0		184	10.48%	114	14.14%	298	11.64%
Three or more Vehicle Accident	0		15	0.85%	9	1.12%	24	0.94%
Unknown Number of Vehicles	0		0	0.00%	0	0.00%	0	0.00%
Location								
On Road	0		882	50.26%	456	56.58%	1,338	52.25%
Off Road	0		506	28.83%	215	26.67%	721	28.15%
Off Road Left	0		275	15.67%	95	11.79%	370	14.45%
Off Road Right	0		231	13.16%	120	14.89%	351	13.71%
Off Road at Tee	0		0	0.00%	0	0.00%	0	0.00%
Off Road in Median	0		0	0.00%	0	0.00%	0	0.00%
Unknown Road Location	0		367	20.91%	135	16.75%	502	19.60%
Accident Type								
Overturning	0		324	18.46%	202	25.06%	526	20.54%
Other Non Collision	0		86	4.90%	29	3.60%	115	4.49%
School Age Pedestrians	0		0	0.00%	0	0.00%	0	0.00%
All Other Pedestrians	0		1	0.06%	2	0.25%	3	0.12%
Broadside	0		17	0.97%	6	0.74%	23	0.90%
Head On	0		1	0.06%	6	0.74%	7	0.27%
Rear End	0		55	3.13%	49	6.08%	104	4.06%
Sideswipe (Same Direction)	0		90	5.13%	45	5.58%	135	5.27%
Sideswipe (Opposite Direction)	0		6	0.34%	4	0.50%	10	0.39%
Approach Turn	0		0	0.00%	0	0.00%	0	0.00%
Overtaking Turn	0		0	0.00%	0	0.00%	0	0.00%
Parked Motor Vehicle	0		10	0.57%	3	0.37%	13	0.51%
Railway Vehicle	0		0	0.00%	0	0.00%	0	0.00%
Bicycle	0		0	0.00%	0	0.00%	0	0.00%
Motorized Bicycle	0		0	0.00%	0	0.00%	0	0.00%
Domestic Animal	0		1	0.06%	2	0.25%	3	0.12%
Wild Animal	0		308	17.55%	171	21.22%	479	18.70%
Light or Utility Pole	0		0	0.00%	4	0.50%	4	0.16%
Traffic Signal Pole	0		0	0.00%	0	0.00%	0	0.00%
Sign	0		15	0.85%	8	0.99%	23	0.90%
Bridge Rail	0		52	2.96%	10	1.24%	62	2.42%
Guard Rail	0		181	10.31%	109	13.52%	290	11.32%
Cable Rail	0		0	0.00%	0	0.00%	0	0.00%
Median Barrier	0		324	18.46%	36	4.47%	360	14.06%
Bridge Abutment	0		0	0.00%	0	0.00%	0	0.00%
Column or Pier	0		1	0.06%	0	0.00%	1	0.04%
Culvert or Headwall	0		1	0.06%	5	0.62%	6	0.23%
Embankment	0		138	7.86%	38	4.71%	176	6.87%
Curb	0		0	0.00%	1	0.12%	1	0.04%
Delineator Post	0		0	0.00%	0	0.00%	0	0.00%
Fence	0		17	0.97%	44	5.46%	61	2.38%
Tree	0		27	1.54%	5	0.62%	32	1.25%
Large Boulder	0		13	0.74%	6	0.74%	19	0.74%
Rocks in Roadway	0		0	0.00%	0	0.00%	0	0.00%
Barricade	0		0	0.00%	0	0.00%	0	0.00%
Wall or Building	0		0	0.00%	0	0.00%	0	0.00%
Crash Cushion	0		2	0.11%	1	0.12%	3	0.12%
Mailbox	0		0	0.00%	0	0.00%	0	0.00%
Other Fixed Object	0		31	1.77%	8	0.99%	39	1.52%
Involving Other Object	0		36	2.05%	4	0.50%	40	1.56%
Road Maintenance Equipment	0		0	0.00%	0	0.00%	0	0.00%
Unknown Accident Type	0		18	1.03%	8	0.99%	26	1.02%
Total Fixed Objects	0		802	45.70%	275	34.12%	1,077	42.05%
Total Other Objects	0		36	2.05%	4	0.50%	40	1.56%

Montana Rural Mountainous 4-Lane Divided Freeways								
Description	0 - 0 ADT		0 - 8000 ADT		> 8000 ADT		All Totals	
	Accidents	Percent	Accidents	Percent	Accidents	Percent	Accidents	Percent
Lighting								
Daylight	0		1,051	59.89%	442	54.84%	1,493	58.30%
Dawn or Dusk	0		78	4.44%	44	5.46%	122	4.76%
Dark - Lighted	0		8	0.46%	10	1.24%	18	0.70%
Dark - Unlighted	0		617	35.16%	310	38.46%	927	36.20%
Unknown Lighting	0		1	0.06%	0	0.00%	1	0.04%
Weather								
No Adverse Weather	0		1,192	67.92%	538	66.75%	1,730	67.55%
Rain	0		109	6.21%	33	4.09%	142	5.54%
Snow or Sleet or Hail	0		435	24.79%	223	27.67%	658	25.69%
Fog	0		16	0.91%	5	0.62%	21	0.82%
Dust	0		0	0.00%	1	0.12%	1	0.04%
Wind	0		0	0.00%	5	0.62%	5	0.20%
Unknown Weather	0		3	0.17%	1	0.12%	4	0.16%
Road Condition								
Dry Road	0		670	38.18%	342	42.43%	1,012	39.52%
Wet Road	0		217	12.36%	63	7.82%	280	10.93%
Muddy Road	0		5	0.28%	1	0.12%	6	0.23%
Snowy Road	0		422	24.05%	193	23.95%	615	24.01%
Icy Road	0		432	24.62%	204	25.31%	636	24.83%
Slushy Road	0		0	0.00%	0	0.00%	0	0.00%
Foreign Material Road	0		0	0.00%	1	0.12%	1	0.04%
With Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Dry with Icy Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Wet with Icy Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Snowy with Icy Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Icy with Icy Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Slushy with Icy Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Unknown Road Condition	0		9	0.51%	2	0.25%	11	0.43%
Contributing Factor								
No Apparent Contributing Factor	0		215	12.25%	102	12.66%	317	12.38%
Asleep at the Wheel	0		39	2.22%	17	2.11%	56	2.19%
Illness	0		0	0.00%	0	0.00%	0	0.00%
Distracted by Passenger	0		0	0.00%	0	0.00%	0	0.00%
Driver Inexperience	0		0	0.00%	0	0.00%	0	0.00%
Driver Fatigue	0		0	0.00%	0	0.00%	0	0.00%
Driver Preoccupied	0		72	4.10%	28	3.47%	100	3.90%
Driver Unfamiliar with Area	0		0	0.00%	0	0.00%	0	0.00%
Driver Emotionally Upset	0		0	0.00%	0	0.00%	0	0.00%
Evading Law Enforcement Officer	0		0	0.00%	0	0.00%	0	0.00%
Physical Disability	0		0	0.00%	0	0.00%	0	0.00%
Unknown Contributing Factor	0		1,429	81.42%	659	81.76%	2,088	81.53%
Condition of Driver								
No Impairment Suspected	0		1,613	91.91%	751	93.18%	2,364	92.31%
Alcohol Involved	0		56	3.19%	25	3.10%	81	3.16%
RX Drugs or Medication Involved	0		0	0.00%	0	0.00%	0	0.00%
Illegal Drugs Involved	0		11	0.63%	10	1.24%	21	0.82%
Alcohol and Drugs Involved	0		6	0.34%	7	0.87%	13	0.51%
Driver/Pedestrian Not Observed	0		13	0.74%	0	0.00%	13	0.51%
Unknown Condition	0		56	3.19%	13	1.61%	69	2.69%
Total Accidents:	0		1,755	68.53%	806	31.47%	2,561	100.00%

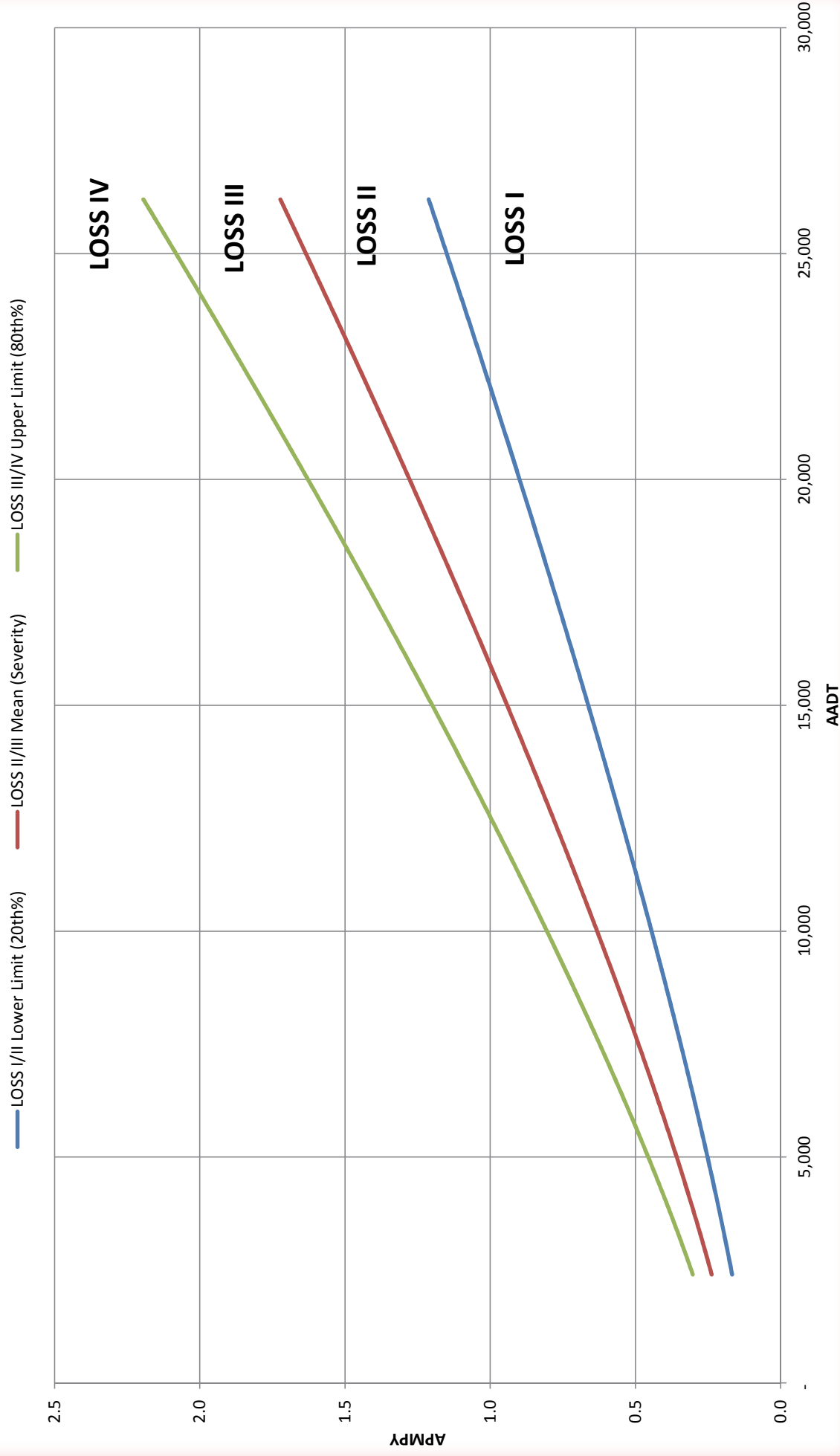


Montana Urban 4-Lane Divided Freeways



SPF, LOSS, and Diagnostic Norms

SPF - Urban Flat, Rolling, and Mountainous 4-Lane Divided Freeways



Model:

SPF - Urban Flat, Rolling, and Mountainous 4-Lane Divided Freeways

Dispersion (Alpha) = 1.1975E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
2,400	0.1672	0.2377	0.3027
2,450	0.1686	0.2398	0.3054
2,500	0.1701	0.2419	0.3081
2,550	0.1716	0.2440	0.3108
2,600	0.1731	0.2461	0.3135
2,650	0.1746	0.2483	0.3162
2,700	0.1761	0.2504	0.3189
2,750	0.1777	0.2526	0.3217
2,800	0.1792	0.2547	0.3244
2,850	0.1807	0.2569	0.3272
2,900	0.1823	0.2591	0.3300
2,950	0.1838	0.2613	0.3328
3,000	0.1854	0.2635	0.3356
3,050	0.1869	0.2657	0.3384
3,100	0.1885	0.2679	0.3413
3,150	0.1900	0.2702	0.3441
3,200	0.1916	0.2724	0.3470
3,250	0.1932	0.2747	0.3498
3,300	0.1948	0.2769	0.3527
3,350	0.1964	0.2792	0.3556
3,400	0.1980	0.2815	0.3585
3,450	0.1996	0.2837	0.3614
3,500	0.2012	0.2860	0.3643
3,550	0.2028	0.2883	0.3672
3,600	0.2044	0.2906	0.3702
3,650	0.2061	0.2929	0.3731
3,700	0.2077	0.2953	0.3761
3,750	0.2093	0.2976	0.3790
3,800	0.2110	0.2999	0.3820
3,850	0.2126	0.3023	0.3850
3,900	0.2143	0.3046	0.3880
3,950	0.2159	0.3070	0.3910
4,000	0.2176	0.3093	0.3940
4,050	0.2193	0.3117	0.3970
4,100	0.2209	0.3141	0.4000
4,150	0.2226	0.3165	0.4031
4,200	0.2243	0.3188	0.4061
4,250	0.2260	0.3212	0.4092
4,300	0.2277	0.3237	0.4122
4,350	0.2294	0.3261	0.4153
4,400	0.2311	0.3285	0.4184
4,450	0.2328	0.3309	0.4215
4,500	0.2345	0.3333	0.4246
4,550	0.2362	0.3358	0.4277

Model:

SPF - Urban Flat, Rolling, and Mountainous 4-Lane Divided Freeways

Dispersion (Alpha) = 1.1975E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
4,600	0.2379	0.3382	0.4308
4,650	0.2396	0.3407	0.4339
4,700	0.2414	0.3431	0.4370
4,750	0.2431	0.3456	0.4402
4,800	0.2448	0.3481	0.4433
4,850	0.2466	0.3505	0.4464
4,900	0.2483	0.3530	0.4496
4,950	0.2501	0.3555	0.4528
5,000	0.2518	0.3580	0.4559
5,050	0.2536	0.3605	0.4591
5,100	0.2553	0.3630	0.4623
5,150	0.2571	0.3655	0.4655
5,200	0.2589	0.3680	0.4687
5,250	0.2606	0.3705	0.4719
5,300	0.2624	0.3731	0.4752
5,350	0.2642	0.3756	0.4784
5,400	0.2660	0.3781	0.4816
5,450	0.2678	0.3807	0.4849
5,500	0.2696	0.3832	0.4881
5,550	0.2714	0.3858	0.4914
5,600	0.2732	0.3883	0.4946
5,650	0.2750	0.3909	0.4979
5,700	0.2768	0.3935	0.5012
5,750	0.2786	0.3961	0.5044
5,800	0.2804	0.3986	0.5077
5,850	0.2822	0.4012	0.5110
5,900	0.2841	0.4038	0.5143
5,950	0.2859	0.4064	0.5176
6,000	0.2877	0.4090	0.5210
6,050	0.2895	0.4116	0.5243
6,100	0.2914	0.4142	0.5276
6,150	0.2932	0.4169	0.5309
6,200	0.2951	0.4195	0.5343
6,250	0.2969	0.4221	0.5376
6,300	0.2988	0.4248	0.5410
6,350	0.3006	0.4274	0.5444
6,400	0.3025	0.4300	0.5477
6,450	0.3044	0.4327	0.5511
6,500	0.3062	0.4353	0.5545
6,550	0.3081	0.4380	0.5579
6,600	0.3100	0.4407	0.5613
6,650	0.3118	0.4433	0.5647
6,700	0.3137	0.4460	0.5681
6,750	0.3156	0.4487	0.5715

Model:

SPF - Urban Flat, Rolling, and Mountainous 4-Lane Divided Freeways

Dispersion (Alpha) = 1.1975E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
6,800	0.3175	0.4514	0.5749
6,850	0.3194	0.4541	0.5783
6,900	0.3213	0.4567	0.5817
6,950	0.3232	0.4594	0.5852
7,000	0.3251	0.4621	0.5886
7,050	0.3270	0.4648	0.5921
7,100	0.3289	0.4676	0.5955
7,150	0.3308	0.4703	0.5990
7,200	0.3327	0.4730	0.6024
7,250	0.3346	0.4757	0.6059
7,300	0.3365	0.4784	0.6094
7,350	0.3385	0.4812	0.6129
7,400	0.3404	0.4839	0.6163
7,450	0.3423	0.4867	0.6198
7,500	0.3443	0.4894	0.6233
7,550	0.3462	0.4922	0.6268
7,600	0.3481	0.4949	0.6303
7,650	0.3501	0.4977	0.6339
7,700	0.3520	0.5004	0.6374
7,750	0.3540	0.5032	0.6409
7,800	0.3559	0.5060	0.6444
7,850	0.3579	0.5087	0.6480
7,900	0.3598	0.5115	0.6515
7,950	0.3618	0.5143	0.6551
8,000	0.3637	0.5171	0.6586
8,050	0.3657	0.5199	0.6622
8,100	0.3677	0.5227	0.6657
8,150	0.3696	0.5255	0.6693
8,200	0.3716	0.5283	0.6729
8,250	0.3736	0.5311	0.6764
8,300	0.3756	0.5339	0.6800
8,350	0.3775	0.5367	0.6836
8,400	0.3795	0.5396	0.6872
8,450	0.3815	0.5424	0.6908
8,500	0.3835	0.5452	0.6944
8,550	0.3855	0.5480	0.6980
8,600	0.3875	0.5509	0.7016
8,650	0.3895	0.5537	0.7052
8,700	0.3915	0.5566	0.7089
8,750	0.3935	0.5594	0.7125
8,800	0.3955	0.5623	0.7161
8,850	0.3975	0.5651	0.7198
8,900	0.3995	0.5680	0.7234
8,950	0.4015	0.5708	0.7271

Model:

SPF - Urban Flat, Rolling, and Mountainous 4-Lane Divided Freeways

Dispersion (Alpha) = 1.1975E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
9,000	0.4036	0.5737	0.7307
9,050	0.4056	0.5766	0.7344
9,100	0.4076	0.5795	0.7380
9,150	0.4096	0.5823	0.7417
9,200	0.4117	0.5852	0.7454
9,250	0.4137	0.5881	0.7491
9,300	0.4157	0.5910	0.7527
9,350	0.4178	0.5939	0.7564
9,400	0.4198	0.5968	0.7601
9,450	0.4218	0.5997	0.7638
9,500	0.4239	0.6026	0.7675
9,550	0.4259	0.6055	0.7712
9,600	0.4280	0.6084	0.7749
9,650	0.4300	0.6113	0.7786
9,700	0.4321	0.6143	0.7824
9,750	0.4341	0.6172	0.7861
9,800	0.4362	0.6201	0.7898
9,850	0.4383	0.6230	0.7935
9,900	0.4403	0.6260	0.7973
9,950	0.4424	0.6289	0.8010
10,000	0.4445	0.6319	0.8048
10,050	0.4465	0.6348	0.8085
10,100	0.4486	0.6377	0.8123
10,150	0.4507	0.6407	0.8160
10,200	0.4528	0.6437	0.8198
10,250	0.4548	0.6466	0.8236
10,300	0.4569	0.6496	0.8273
10,350	0.4590	0.6525	0.8311
10,400	0.4611	0.6555	0.8349
10,450	0.4632	0.6585	0.8387
10,500	0.4653	0.6615	0.8425
10,550	0.4674	0.6644	0.8463
10,600	0.4695	0.6674	0.8501
10,650	0.4716	0.6704	0.8539
10,700	0.4737	0.6734	0.8577
10,750	0.4758	0.6764	0.8615
10,800	0.4779	0.6794	0.8653
10,850	0.4800	0.6824	0.8691
10,900	0.4821	0.6854	0.8729
10,950	0.4842	0.6884	0.8768
11,000	0.4863	0.6914	0.8806
11,050	0.4884	0.6944	0.8844
11,100	0.4906	0.6974	0.8883
11,150	0.4927	0.7004	0.8921

Model:

SPF - Urban Flat, Rolling, and Mountainous 4-Lane Divided Freeways

Dispersion (Alpha) = 1.1975E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
11,200	0.4948	0.7035	0.8960
11,250	0.4969	0.7065	0.8998
11,300	0.4991	0.7095	0.9037
11,350	0.5012	0.7125	0.9075
11,400	0.5033	0.7156	0.9114
11,450	0.5055	0.7186	0.9153
11,500	0.5076	0.7217	0.9191
11,550	0.5098	0.7247	0.9230
11,600	0.5119	0.7277	0.9269
11,650	0.5140	0.7308	0.9308
11,700	0.5162	0.7338	0.9347
11,750	0.5183	0.7369	0.9386
11,800	0.5205	0.7400	0.9425
11,850	0.5226	0.7430	0.9464
11,900	0.5248	0.7461	0.9503
11,950	0.5270	0.7492	0.9542
12,000	0.5291	0.7522	0.9581
12,050	0.5313	0.7553	0.9620
12,100	0.5335	0.7584	0.9659
12,150	0.5356	0.7615	0.9698
12,200	0.5378	0.7645	0.9738
12,250	0.5400	0.7676	0.9777
12,300	0.5421	0.7707	0.9816
12,350	0.5443	0.7738	0.9856
12,400	0.5465	0.7769	0.9895
12,450	0.5487	0.7800	0.9935
12,500	0.5508	0.7831	0.9974
12,550	0.5530	0.7862	1.0014
12,600	0.5552	0.7893	1.0053
12,650	0.5574	0.7924	1.0093
12,700	0.5596	0.7955	1.0132
12,750	0.5618	0.7987	1.0172
12,800	0.5640	0.8018	1.0212
12,850	0.5662	0.8049	1.0252
12,900	0.5684	0.8080	1.0291
12,950	0.5706	0.8112	1.0331
13,000	0.5728	0.8143	1.0371
13,050	0.5750	0.8174	1.0411
13,100	0.5772	0.8206	1.0451
13,150	0.5794	0.8237	1.0491
13,200	0.5816	0.8268	1.0531
13,250	0.5838	0.8300	1.0571
13,300	0.5860	0.8331	1.0611
13,350	0.5882	0.8363	1.0651

Model:

SPF - Urban Flat, Rolling, and Mountainous 4-Lane Divided Freeways

Dispersion (Alpha) = 1.1975E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
13,400	0.5905	0.8394	1.0691
13,450	0.5927	0.8426	1.0732
13,500	0.5949	0.8457	1.0772
13,550	0.5971	0.8489	1.0812
13,600	0.5994	0.8521	1.0852
13,650	0.6016	0.8552	1.0893
13,700	0.6038	0.8584	1.0933
13,750	0.6060	0.8616	1.0974
13,800	0.6083	0.8648	1.1014
13,850	0.6105	0.8679	1.1054
13,900	0.6128	0.8711	1.1095
13,950	0.6150	0.8743	1.1136
14,000	0.6172	0.8775	1.1176
14,050	0.6195	0.8807	1.1217
14,100	0.6217	0.8839	1.1257
14,150	0.6240	0.8871	1.1298
14,200	0.6262	0.8903	1.1339
14,250	0.6285	0.8935	1.1380
14,300	0.6307	0.8967	1.1420
14,350	0.6330	0.8999	1.1461
14,400	0.6352	0.9031	1.1502
14,450	0.6375	0.9063	1.1543
14,500	0.6397	0.9095	1.1584
14,550	0.6420	0.9127	1.1625
14,600	0.6443	0.9159	1.1666
14,650	0.6465	0.9192	1.1707
14,700	0.6488	0.9224	1.1748
14,750	0.6511	0.9256	1.1789
14,800	0.6533	0.9288	1.1830
14,850	0.6556	0.9321	1.1871
14,900	0.6579	0.9353	1.1912
14,950	0.6602	0.9385	1.1954
15,000	0.6625	0.9418	1.1995
15,050	0.6647	0.9450	1.2036
15,100	0.6670	0.9483	1.2077
15,150	0.6693	0.9515	1.2119
15,200	0.6716	0.9548	1.2160
15,250	0.6739	0.9580	1.2202
15,300	0.6762	0.9613	1.2243
15,350	0.6785	0.9645	1.2285
15,400	0.6807	0.9678	1.2326
15,450	0.6830	0.9710	1.2368
15,500	0.6853	0.9743	1.2409
15,550	0.6876	0.9776	1.2451

Model:

SPF - Urban Flat, Rolling, and Mountainous 4-Lane Divided Freeways

Dispersion (Alpha) = 1.1975E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
15,600	0.6899	0.9808	1.2492
15,650	0.6922	0.9841	1.2534
15,700	0.6945	0.9874	1.2576
15,750	0.6968	0.9907	1.2618
15,800	0.6991	0.9939	1.2659
15,850	0.7015	0.9972	1.2701
15,900	0.7038	1.0005	1.2743
15,950	0.7061	1.0038	1.2785
16,000	0.7084	1.0071	1.2827
16,050	0.7107	1.0104	1.2869
16,100	0.7130	1.0137	1.2911
16,150	0.7153	1.0170	1.2953
16,200	0.7177	1.0203	1.2995
16,250	0.7200	1.0236	1.3037
16,300	0.7223	1.0269	1.3079
16,350	0.7246	1.0302	1.3121
16,400	0.7270	1.0335	1.3163
16,450	0.7293	1.0368	1.3205
16,500	0.7316	1.0401	1.3247
16,550	0.7340	1.0434	1.3290
16,600	0.7363	1.0467	1.3332
16,650	0.7386	1.0501	1.3374
16,700	0.7410	1.0534	1.3416
16,750	0.7433	1.0567	1.3459
16,800	0.7456	1.0600	1.3501
16,850	0.7480	1.0634	1.3544
16,900	0.7503	1.0667	1.3586
16,950	0.7527	1.0700	1.3629
17,000	0.7550	1.0734	1.3671
17,050	0.7574	1.0767	1.3714
17,100	0.7597	1.0801	1.3756
17,150	0.7621	1.0834	1.3799
17,200	0.7644	1.0867	1.3841
17,250	0.7668	1.0901	1.3884
17,300	0.7691	1.0934	1.3927
17,350	0.7715	1.0968	1.3969
17,400	0.7739	1.1001	1.4012
17,450	0.7762	1.1035	1.4055
17,500	0.7786	1.1069	1.4098
17,550	0.7809	1.1102	1.4140
17,600	0.7833	1.1136	1.4183
17,650	0.7857	1.1170	1.4226
17,700	0.7881	1.1203	1.4269
17,750	0.7904	1.1237	1.4312

Model:

SPF - Urban Flat, Rolling, and Mountainous 4-Lane Divided Freeways

Dispersion (Alpha) = 1.1975E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
17,800	0.7928	1.1271	1.4355
17,850	0.7952	1.1305	1.4398
17,900	0.7975	1.1338	1.4441
17,950	0.7999	1.1372	1.4484
18,000	0.8023	1.1406	1.4527
18,050	0.8047	1.1440	1.4570
18,100	0.8071	1.1474	1.4613
18,150	0.8095	1.1508	1.4657
18,200	0.8118	1.1541	1.4700
18,250	0.8142	1.1575	1.4743
18,300	0.8166	1.1609	1.4786
18,350	0.8190	1.1643	1.4830
18,400	0.8214	1.1677	1.4873
18,450	0.8238	1.1711	1.4916
18,500	0.8262	1.1745	1.4960
18,550	0.8286	1.1779	1.5003
18,600	0.8310	1.1814	1.5046
18,650	0.8334	1.1848	1.5090
18,700	0.8358	1.1882	1.5133
18,750	0.8382	1.1916	1.5177
18,800	0.8406	1.1950	1.5220
18,850	0.8430	1.1984	1.5264
18,900	0.8454	1.2019	1.5307
18,950	0.8478	1.2053	1.5351
19,000	0.8502	1.2087	1.5395
19,050	0.8526	1.2121	1.5438
19,100	0.8550	1.2156	1.5482
19,150	0.8575	1.2190	1.5526
19,200	0.8599	1.2224	1.5570
19,250	0.8623	1.2259	1.5613
19,300	0.8647	1.2293	1.5657
19,350	0.8671	1.2327	1.5701
19,400	0.8696	1.2362	1.5745
19,450	0.8720	1.2396	1.5789
19,500	0.8744	1.2431	1.5833
19,550	0.8768	1.2465	1.5877
19,600	0.8793	1.2500	1.5921
19,650	0.8817	1.2534	1.5964
19,700	0.8841	1.2569	1.6009
19,750	0.8865	1.2604	1.6053
19,800	0.8890	1.2638	1.6097
19,850	0.8914	1.2673	1.6141
19,900	0.8939	1.2707	1.6185
19,950	0.8963	1.2742	1.6229

Model:

SPF - Urban Flat, Rolling, and Mountainous 4-Lane Divided Freeways

Dispersion (Alpha) = 1.1975E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
20,000	0.8987	1.2777	1.6273
20,050	0.9012	1.2811	1.6317
20,100	0.9036	1.2846	1.6362
20,150	0.9061	1.2881	1.6406
20,200	0.9085	1.2916	1.6450
20,250	0.9110	1.2950	1.6494
20,300	0.9134	1.2985	1.6539
20,350	0.9158	1.3020	1.6583
20,400	0.9183	1.3055	1.6628
20,450	0.9208	1.3090	1.6672
20,500	0.9232	1.3125	1.6716
20,550	0.9257	1.3160	1.6761
20,600	0.9281	1.3195	1.6805
20,650	0.9306	1.3230	1.6850
20,700	0.9330	1.3264	1.6894
20,750	0.9355	1.3299	1.6939
20,800	0.9380	1.3334	1.6983
20,850	0.9404	1.3370	1.7028
20,900	0.9429	1.3405	1.7073
20,950	0.9454	1.3440	1.7117
21,000	0.9478	1.3475	1.7162
21,050	0.9503	1.3510	1.7207
21,100	0.9528	1.3545	1.7252
21,150	0.9552	1.3580	1.7296
21,200	0.9577	1.3615	1.7341
21,250	0.9602	1.3650	1.7386
21,300	0.9627	1.3686	1.7431
21,350	0.9651	1.3721	1.7476
21,400	0.9676	1.3756	1.7521
21,450	0.9701	1.3791	1.7565
21,500	0.9726	1.3827	1.7610
21,550	0.9751	1.3862	1.7655
21,600	0.9776	1.3897	1.7700
21,650	0.9800	1.3933	1.7745
21,700	0.9825	1.3968	1.7790
21,750	0.9850	1.4003	1.7835
21,800	0.9875	1.4039	1.7881
21,850	0.9900	1.4074	1.7926
21,900	0.9925	1.4110	1.7971
21,950	0.9950	1.4145	1.8016
22,000	0.9975	1.4181	1.8061
22,050	1.0000	1.4216	1.8106
22,100	1.0025	1.4252	1.8152
22,150	1.0050	1.4287	1.8197

Model:

SPF - Urban Flat, Rolling, and Mountainous 4-Lane Divided Freeways

Dispersion (Alpha) = 1.1975E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
22,200	1.0075	1.4323	1.8242
22,250	1.0100	1.4358	1.8287
22,300	1.0125	1.4394	1.8333
22,350	1.0150	1.4429	1.8378
22,400	1.0175	1.4465	1.8424
22,450	1.0200	1.4501	1.8469
22,500	1.0225	1.4536	1.8514
22,550	1.0250	1.4572	1.8560
22,600	1.0275	1.4608	1.8605
22,650	1.0300	1.4644	1.8651
22,700	1.0326	1.4679	1.8696
22,750	1.0351	1.4715	1.8742
22,800	1.0376	1.4751	1.8787
22,850	1.0401	1.4787	1.8833
22,900	1.0426	1.4822	1.8879
22,950	1.0451	1.4858	1.8924
23,000	1.0477	1.4894	1.8970
23,050	1.0502	1.4930	1.9016
23,100	1.0527	1.4966	1.9061
23,150	1.0552	1.5002	1.9107
23,200	1.0578	1.5038	1.9153
23,250	1.0603	1.5074	1.9199
23,300	1.0628	1.5110	1.9244
23,350	1.0654	1.5146	1.9290
23,400	1.0679	1.5182	1.9336
23,450	1.0704	1.5218	1.9382
23,500	1.0730	1.5254	1.9428
23,550	1.0755	1.5290	1.9474
23,600	1.0780	1.5326	1.9520
23,650	1.0806	1.5362	1.9566
23,700	1.0831	1.5398	1.9612
23,750	1.0857	1.5434	1.9658
23,800	1.0882	1.5470	1.9704
23,850	1.0907	1.5506	1.9750
23,900	1.0933	1.5543	1.9796
23,950	1.0958	1.5579	1.9842
24,000	1.0984	1.5615	1.9888
24,050	1.1009	1.5651	1.9934
24,100	1.1035	1.5688	1.9980
24,150	1.1060	1.5724	2.0027
24,200	1.1086	1.5760	2.0073
24,250	1.1111	1.5796	2.0119
24,300	1.1137	1.5833	2.0165
24,350	1.1162	1.5869	2.0212

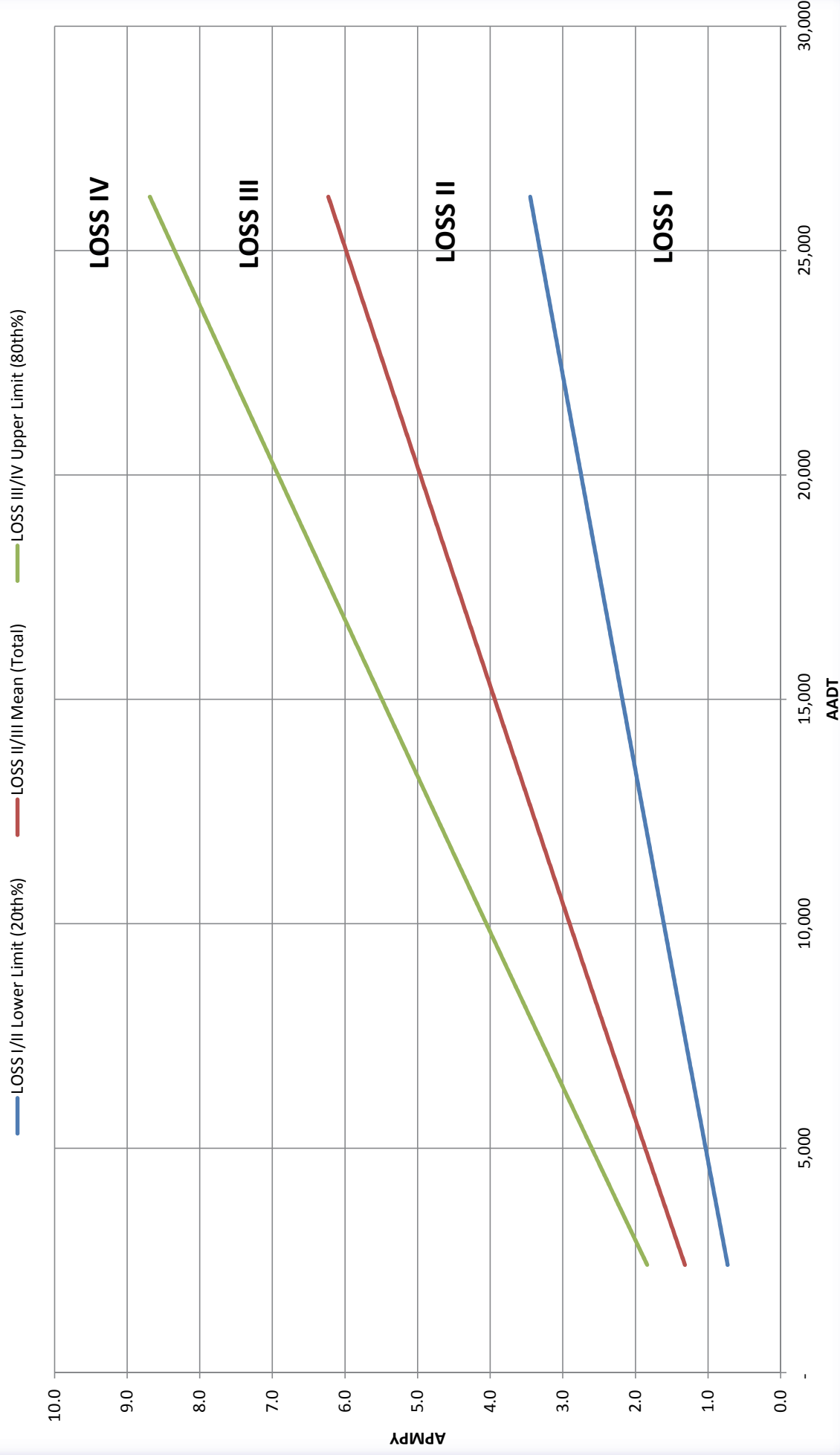
Model:

SPF - Urban Flat, Rolling, and Mountainous 4-Lane Divided Freeways

Dispersion (Alpha) = 1.1975E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
24,400	1.1188	1.5905	2.0258
24,450	1.1214	1.5942	2.0304
24,500	1.1239	1.5978	2.0351
24,550	1.1265	1.6015	2.0397
24,600	1.1290	1.6051	2.0443
24,650	1.1316	1.6088	2.0490
24,700	1.1342	1.6124	2.0536
24,750	1.1367	1.6160	2.0583
24,800	1.1393	1.6197	2.0629
24,850	1.1419	1.6233	2.0676
24,900	1.1445	1.6270	2.0722
24,950	1.1470	1.6307	2.0769
25,000	1.1496	1.6343	2.0815
25,050	1.1522	1.6380	2.0862
25,100	1.1547	1.6416	2.0909
25,150	1.1573	1.6453	2.0955
25,200	1.1599	1.6490	2.1002
25,250	1.1625	1.6526	2.1049
25,300	1.1651	1.6563	2.1095
25,350	1.1676	1.6600	2.1142
25,400	1.1702	1.6636	2.1189
25,450	1.1728	1.6673	2.1236
25,500	1.1754	1.6710	2.1282
25,550	1.1780	1.6747	2.1329
25,600	1.1806	1.6783	2.1376
25,650	1.1831	1.6820	2.1423
25,700	1.1857	1.6857	2.1470
25,750	1.1883	1.6894	2.1517
25,800	1.1909	1.6931	2.1564
25,850	1.1935	1.6967	2.1611
25,900	1.1961	1.7004	2.1658
25,950	1.1987	1.7041	2.1705
26,000	1.2013	1.7078	2.1752
26,050	1.2039	1.7115	2.1799
26,100	1.2065	1.7152	2.1846
26,150	1.2091	1.7189	2.1893
26,200	1.2117	1.7226	2.1940

SPF Urban Flat, Rolling, and Mountainous 4-Lane Divided Freeways



Model:

SPF - Urban Flat, Rolling, and Mountainous 4-Lane Divided Freeways

Dispersion (Alpha) = 2.7573E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
2,400	0.7300	1.3185	1.8388
2,450	0.7359	1.3291	1.8536
2,500	0.7418	1.3397	1.8684
2,550	0.7476	1.3503	1.8831
2,600	0.7535	1.3609	1.8979
2,650	0.7593	1.3714	1.9126
2,700	0.7652	1.3820	1.9274
2,750	0.7711	1.3926	1.9421
2,800	0.7769	1.4032	1.9569
2,850	0.7828	1.4137	1.9716
2,900	0.7886	1.4243	1.9863
2,950	0.7945	1.4348	2.0010
3,000	0.8003	1.4454	2.0158
3,050	0.8061	1.4559	2.0305
3,100	0.8120	1.4665	2.0452
3,150	0.8178	1.4770	2.0599
3,200	0.8237	1.4876	2.0746
3,250	0.8295	1.4981	2.0893
3,300	0.8353	1.5087	2.1040
3,350	0.8412	1.5192	2.1187
3,400	0.8470	1.5297	2.1334
3,450	0.8528	1.5403	2.1481
3,500	0.8587	1.5508	2.1628
3,550	0.8645	1.5613	2.1775
3,600	0.8703	1.5719	2.1921
3,650	0.8761	1.5824	2.2068
3,700	0.8820	1.5929	2.2215
3,750	0.8878	1.6034	2.2362
3,800	0.8936	1.6139	2.2508
3,850	0.8994	1.6245	2.2655
3,900	0.9053	1.6350	2.2801
3,950	0.9111	1.6455	2.2948
4,000	0.9169	1.6560	2.3095
4,050	0.9227	1.6665	2.3241
4,100	0.9285	1.6770	2.3387
4,150	0.9343	1.6875	2.3534
4,200	0.9402	1.6980	2.3680
4,250	0.9460	1.7085	2.3827
4,300	0.9518	1.7190	2.3973
4,350	0.9576	1.7295	2.4119
4,400	0.9634	1.7400	2.4266
4,450	0.9692	1.7504	2.4412
4,500	0.9750	1.7609	2.4558
4,550	0.9808	1.7714	2.4704

Model:

SPF - Urban Flat, Rolling, and Mountainous 4-Lane Divided Freeways

Dispersion (Alpha) = 2.7573E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
4,600	0.9866	1.7819	2.4851
4,650	0.9924	1.7924	2.4997
4,700	0.9982	1.8029	2.5143
4,750	1.0040	1.8133	2.5289
4,800	1.0098	1.8238	2.5435
4,850	1.0156	1.8343	2.5581
4,900	1.0214	1.8448	2.5727
4,950	1.0272	1.8552	2.5873
5,000	1.0330	1.8657	2.6019
5,050	1.0388	1.8762	2.6165
5,100	1.0446	1.8866	2.6311
5,150	1.0504	1.8971	2.6457
5,200	1.0562	1.9076	2.6603
5,250	1.0620	1.9180	2.6749
5,300	1.0678	1.9285	2.6895
5,350	1.0736	1.9389	2.7041
5,400	1.0794	1.9494	2.7186
5,450	1.0851	1.9598	2.7332
5,500	1.0909	1.9703	2.7478
5,550	1.0967	1.9807	2.7624
5,600	1.1025	1.9912	2.7769
5,650	1.1083	2.0016	2.7915
5,700	1.1141	2.0121	2.8061
5,750	1.1199	2.0225	2.8206
5,800	1.1256	2.0330	2.8352
5,850	1.1314	2.0434	2.8498
5,900	1.1372	2.0539	2.8643
5,950	1.1430	2.0643	2.8789
6,000	1.1488	2.0747	2.8934
6,050	1.1545	2.0852	2.9080
6,100	1.1603	2.0956	2.9226
6,150	1.1661	2.1060	2.9371
6,200	1.1719	2.1165	2.9517
6,250	1.1776	2.1269	2.9662
6,300	1.1834	2.1373	2.9807
6,350	1.1892	2.1478	2.9953
6,400	1.1950	2.1582	3.0098
6,450	1.2007	2.1686	3.0244
6,500	1.2065	2.1790	3.0389
6,550	1.2123	2.1894	3.0534
6,600	1.2180	2.1999	3.0680
6,650	1.2238	2.2103	3.0825
6,700	1.2296	2.2207	3.0970
6,750	1.2353	2.2311	3.1116

Model:

SPF - Urban Flat, Rolling, and Mountainous 4-Lane Divided Freeways

Dispersion (Alpha) = 2.7573E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
6,800	1.2411	2.2415	3.1261
6,850	1.2469	2.2520	3.1406
6,900	1.2526	2.2624	3.1551
6,950	1.2584	2.2728	3.1697
7,000	1.2642	2.2832	3.1842
7,050	1.2699	2.2936	3.1987
7,100	1.2757	2.3040	3.2132
7,150	1.2815	2.3144	3.2277
7,200	1.2872	2.3248	3.2422
7,250	1.2930	2.3352	3.2567
7,300	1.2988	2.3456	3.2713
7,350	1.3045	2.3560	3.2858
7,400	1.3103	2.3664	3.3003
7,450	1.3160	2.3768	3.3148
7,500	1.3218	2.3872	3.3293
7,550	1.3275	2.3976	3.3438
7,600	1.3333	2.4080	3.3583
7,650	1.3391	2.4184	3.3728
7,700	1.3448	2.4288	3.3873
7,750	1.3506	2.4392	3.4018
7,800	1.3563	2.4496	3.4163
7,850	1.3621	2.4600	3.4308
7,900	1.3678	2.4704	3.4452
7,950	1.3736	2.4808	3.4597
8,000	1.3793	2.4912	3.4742
8,050	1.3851	2.5016	3.4887
8,100	1.3908	2.5119	3.5032
8,150	1.3966	2.5223	3.5177
8,200	1.4023	2.5327	3.5322
8,250	1.4081	2.5431	3.5466
8,300	1.4138	2.5535	3.5611
8,350	1.4196	2.5639	3.5756
8,400	1.4253	2.5742	3.5901
8,450	1.4311	2.5846	3.6045
8,500	1.4368	2.5950	3.6190
8,550	1.4426	2.6054	3.6335
8,600	1.4483	2.6157	3.6480
8,650	1.4541	2.6261	3.6624
8,700	1.4598	2.6365	3.6769
8,750	1.4655	2.6469	3.6914
8,800	1.4713	2.6572	3.7058
8,850	1.4770	2.6676	3.7203
8,900	1.4828	2.6780	3.7348
8,950	1.4885	2.6884	3.7492

Model:

SPF - Urban Flat, Rolling, and Mountainous 4-Lane Divided Freeways

Dispersion (Alpha) = 2.7573E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
9,000	1.4943	2.6987	3.7637
9,050	1.5000	2.7091	3.7781
9,100	1.5057	2.7195	3.7926
9,150	1.5115	2.7298	3.8070
9,200	1.5172	2.7402	3.8215
9,250	1.5229	2.7505	3.8360
9,300	1.5287	2.7609	3.8504
9,350	1.5344	2.7713	3.8649
9,400	1.5402	2.7816	3.8793
9,450	1.5459	2.7920	3.8938
9,500	1.5516	2.8024	3.9082
9,550	1.5574	2.8127	3.9226
9,600	1.5631	2.8231	3.9371
9,650	1.5688	2.8334	3.9515
9,700	1.5746	2.8438	3.9660
9,750	1.5803	2.8541	3.9804
9,800	1.5860	2.8645	3.9949
9,850	1.5918	2.8748	4.0093
9,900	1.5975	2.8852	4.0237
9,950	1.6032	2.8955	4.0382
10,000	1.6090	2.9059	4.0526
10,050	1.6147	2.9162	4.0670
10,100	1.6204	2.9266	4.0815
10,150	1.6262	2.9369	4.0959
10,200	1.6319	2.9473	4.1103
10,250	1.6376	2.9576	4.1248
10,300	1.6433	2.9680	4.1392
10,350	1.6491	2.9783	4.1536
10,400	1.6548	2.9887	4.1680
10,450	1.6605	2.9990	4.1825
10,500	1.6662	3.0094	4.1969
10,550	1.6720	3.0197	4.2113
10,600	1.6777	3.0300	4.2257
10,650	1.6834	3.0404	4.2402
10,700	1.6891	3.0507	4.2546
10,750	1.6949	3.0611	4.2690
10,800	1.7006	3.0714	4.2834
10,850	1.7063	3.0817	4.2978
10,900	1.7120	3.0921	4.3122
10,950	1.7178	3.1024	4.3267
11,000	1.7235	3.1127	4.3411
11,050	1.7292	3.1231	4.3555
11,100	1.7349	3.1334	4.3699
11,150	1.7407	3.1437	4.3843

Model:

SPF - Urban Flat, Rolling, and Mountainous 4-Lane Divided Freeways

Dispersion (Alpha) = 2.7573E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
11,200	1.7464	3.1541	4.3987
11,250	1.7521	3.1644	4.4131
11,300	1.7578	3.1747	4.4275
11,350	1.7635	3.1851	4.4419
11,400	1.7692	3.1954	4.4563
11,450	1.7750	3.2057	4.4707
11,500	1.7807	3.2160	4.4851
11,550	1.7864	3.2264	4.4995
11,600	1.7921	3.2367	4.5139
11,650	1.7978	3.2470	4.5283
11,700	1.8036	3.2573	4.5427
11,750	1.8093	3.2677	4.5571
11,800	1.8150	3.2780	4.5715
11,850	1.8207	3.2883	4.5859
11,900	1.8264	3.2986	4.6003
11,950	1.8321	3.3089	4.6147
12,000	1.8378	3.3193	4.6291
12,050	1.8436	3.3296	4.6435
12,100	1.8493	3.3399	4.6579
12,150	1.8550	3.3502	4.6723
12,200	1.8607	3.3605	4.6867
12,250	1.8664	3.3709	4.7010
12,300	1.8721	3.3812	4.7154
12,350	1.8778	3.3915	4.7298
12,400	1.8835	3.4018	4.7442
12,450	1.8892	3.4121	4.7586
12,500	1.8950	3.4224	4.7730
12,550	1.9007	3.4327	4.7873
12,600	1.9064	3.4430	4.8017
12,650	1.9121	3.4534	4.8161
12,700	1.9178	3.4637	4.8305
12,750	1.9235	3.4740	4.8449
12,800	1.9292	3.4843	4.8592
12,850	1.9349	3.4946	4.8736
12,900	1.9406	3.5049	4.8880
12,950	1.9463	3.5152	4.9024
13,000	1.9520	3.5255	4.9167
13,050	1.9577	3.5358	4.9311
13,100	1.9634	3.5461	4.9455
13,150	1.9692	3.5564	4.9598
13,200	1.9749	3.5667	4.9742
13,250	1.9806	3.5770	4.9886
13,300	1.9863	3.5873	5.0030
13,350	1.9920	3.5976	5.0173

Model:

SPF - Urban Flat, Rolling, and Mountainous 4-Lane Divided Freeways

Dispersion (Alpha) = 2.7573E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
13,400	1.9977	3.6079	5.0317
13,450	2.0034	3.6182	5.0461
13,500	2.0091	3.6285	5.0604
13,550	2.0148	3.6388	5.0748
13,600	2.0205	3.6491	5.0891
13,650	2.0262	3.6594	5.1035
13,700	2.0319	3.6697	5.1179
13,750	2.0376	3.6800	5.1322
13,800	2.0433	3.6903	5.1466
13,850	2.0490	3.7006	5.1609
13,900	2.0547	3.7109	5.1753
13,950	2.0604	3.7212	5.1897
14,000	2.0661	3.7315	5.2040
14,050	2.0718	3.7418	5.2184
14,100	2.0775	3.7521	5.2327
14,150	2.0832	3.7624	5.2471
14,200	2.0889	3.7727	5.2614
14,250	2.0946	3.7830	5.2758
14,300	2.1003	3.7933	5.2901
14,350	2.1060	3.8035	5.3045
14,400	2.1117	3.8138	5.3188
14,450	2.1174	3.8241	5.3332
14,500	2.1231	3.8344	5.3475
14,550	2.1288	3.8447	5.3619
14,600	2.1345	3.8550	5.3762
14,650	2.1402	3.8653	5.3906
14,700	2.1459	3.8756	5.4049
14,750	2.1515	3.8858	5.4192
14,800	2.1572	3.8961	5.4336
14,850	2.1629	3.9064	5.4479
14,900	2.1686	3.9167	5.4623
14,950	2.1743	3.9270	5.4766
15,000	2.1800	3.9373	5.4910
15,050	2.1857	3.9475	5.5053
15,100	2.1914	3.9578	5.5196
15,150	2.1971	3.9681	5.5340
15,200	2.2028	3.9784	5.5483
15,250	2.2085	3.9887	5.5626
15,300	2.2142	3.9989	5.5770
15,350	2.2199	4.0092	5.5913
15,400	2.2255	4.0195	5.6056
15,450	2.2312	4.0298	5.6200
15,500	2.2369	4.0400	5.6343
15,550	2.2426	4.0503	5.6486

Model:

SPF - Urban Flat, Rolling, and Mountainous 4-Lane Divided Freeways

Dispersion (Alpha) = 2.7573E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
15,600	2.2483	4.0606	5.6630
15,650	2.2540	4.0709	5.6773
15,700	2.2597	4.0811	5.6916
15,750	2.2654	4.0914	5.7060
15,800	2.2711	4.1017	5.7203
15,850	2.2767	4.1120	5.7346
15,900	2.2824	4.1222	5.7489
15,950	2.2881	4.1325	5.7633
16,000	2.2938	4.1428	5.7776
16,050	2.2995	4.1530	5.7919
16,100	2.3052	4.1633	5.8062
16,150	2.3109	4.1736	5.8206
16,200	2.3166	4.1839	5.8349
16,250	2.3222	4.1941	5.8492
16,300	2.3279	4.2044	5.8635
16,350	2.3336	4.2147	5.8778
16,400	2.3393	4.2249	5.8922
16,450	2.3450	4.2352	5.9065
16,500	2.3507	4.2455	5.9208
16,550	2.3564	4.2557	5.9351
16,600	2.3620	4.2660	5.9494
16,650	2.3677	4.2763	5.9637
16,700	2.3734	4.2865	5.9780
16,750	2.3791	4.2968	5.9924
16,800	2.3848	4.3070	6.0067
16,850	2.3904	4.3173	6.0210
16,900	2.3961	4.3276	6.0353
16,950	2.4018	4.3378	6.0496
17,000	2.4075	4.3481	6.0639
17,050	2.4132	4.3584	6.0782
17,100	2.4189	4.3686	6.0925
17,150	2.4245	4.3789	6.1068
17,200	2.4302	4.3891	6.1212
17,250	2.4359	4.3994	6.1355
17,300	2.4416	4.4096	6.1498
17,350	2.4473	4.4199	6.1641
17,400	2.4529	4.4302	6.1784
17,450	2.4586	4.4404	6.1927
17,500	2.4643	4.4507	6.2070
17,550	2.4700	4.4609	6.2213
17,600	2.4756	4.4712	6.2356
17,650	2.4813	4.4814	6.2499
17,700	2.4870	4.4917	6.2642
17,750	2.4927	4.5019	6.2785

Model:

SPF - Urban Flat, Rolling, and Mountainous 4-Lane Divided Freeways

Dispersion (Alpha) = 2.7573E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
17,800	2.4984	4.5122	6.2928
17,850	2.5040	4.5225	6.3071
17,900	2.5097	4.5327	6.3214
17,950	2.5154	4.5430	6.3357
18,000	2.5211	4.5532	6.3500
18,050	2.5267	4.5635	6.3643
18,100	2.5324	4.5737	6.3786
18,150	2.5381	4.5840	6.3929
18,200	2.5438	4.5942	6.4072
18,250	2.5494	4.6045	6.4215
18,300	2.5551	4.6147	6.4357
18,350	2.5608	4.6250	6.4500
18,400	2.5665	4.6352	6.4643
18,450	2.5721	4.6455	6.4786
18,500	2.5778	4.6557	6.4929
18,550	2.5835	4.6659	6.5072
18,600	2.5892	4.6762	6.5215
18,650	2.5948	4.6864	6.5358
18,700	2.6005	4.6967	6.5501
18,750	2.6062	4.7069	6.5644
18,800	2.6118	4.7172	6.5786
18,850	2.6175	4.7274	6.5929
18,900	2.6232	4.7377	6.6072
18,950	2.6289	4.7479	6.6215
19,000	2.6345	4.7581	6.6358
19,050	2.6402	4.7684	6.6501
19,100	2.6459	4.7786	6.6643
19,150	2.6515	4.7889	6.6786
19,200	2.6572	4.7991	6.6929
19,250	2.6629	4.8093	6.7072
19,300	2.6686	4.8196	6.7215
19,350	2.6742	4.8298	6.7358
19,400	2.6799	4.8401	6.7500
19,450	2.6856	4.8503	6.7643
19,500	2.6912	4.8605	6.7786
19,550	2.6969	4.8708	6.7929
19,600	2.7026	4.8810	6.8071
19,650	2.7082	4.8913	6.8214
19,700	2.7139	4.9015	6.8357
19,750	2.7196	4.9117	6.8500
19,800	2.7252	4.9220	6.8642
19,850	2.7309	4.9322	6.8785
19,900	2.7366	4.9424	6.8928
19,950	2.7422	4.9527	6.9071

Model:

SPF - Urban Flat, Rolling, and Mountainous 4-Lane Divided Freeways

Dispersion (Alpha) = 2.7573E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
20,000	2.7479	4.9629	6.9213
20,050	2.7536	4.9731	6.9356
20,100	2.7592	4.9834	6.9499
20,150	2.7649	4.9936	6.9642
20,200	2.7706	5.0038	6.9784
20,250	2.7762	5.0141	6.9927
20,300	2.7819	5.0243	7.0070
20,350	2.7876	5.0345	7.0212
20,400	2.7932	5.0448	7.0355
20,450	2.7989	5.0550	7.0498
20,500	2.8046	5.0652	7.0640
20,550	2.8102	5.0754	7.0783
20,600	2.8159	5.0857	7.0926
20,650	2.8215	5.0959	7.1068
20,700	2.8272	5.1061	7.1211
20,750	2.8329	5.1164	7.1354
20,800	2.8385	5.1266	7.1496
20,850	2.8442	5.1368	7.1639
20,900	2.8499	5.1470	7.1781
20,950	2.8555	5.1573	7.1924
21,000	2.8612	5.1675	7.2067
21,050	2.8668	5.1777	7.2209
21,100	2.8725	5.1879	7.2352
21,150	2.8782	5.1982	7.2494
21,200	2.8838	5.2084	7.2637
21,250	2.8895	5.2186	7.2780
21,300	2.8951	5.2288	7.2922
21,350	2.9008	5.2391	7.3065
21,400	2.9065	5.2493	7.3207
21,450	2.9121	5.2595	7.3350
21,500	2.9178	5.2697	7.3492
21,550	2.9234	5.2799	7.3635
21,600	2.9291	5.2902	7.3777
21,650	2.9348	5.3004	7.3920
21,700	2.9404	5.3106	7.4063
21,750	2.9461	5.3208	7.4205
21,800	2.9517	5.3310	7.4348
21,850	2.9574	5.3413	7.4490
21,900	2.9631	5.3515	7.4633
21,950	2.9687	5.3617	7.4775
22,000	2.9744	5.3719	7.4918
22,050	2.9800	5.3821	7.5060
22,100	2.9857	5.3924	7.5203
22,150	2.9913	5.4026	7.5345

Model:

SPF - Urban Flat, Rolling, and Mountainous 4-Lane Divided Freeways

Dispersion (Alpha) = 2.7573E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
22,200	2.9970	5.4128	7.5488
22,250	3.0027	5.4230	7.5630
22,300	3.0083	5.4332	7.5772
22,350	3.0140	5.4434	7.5915
22,400	3.0196	5.4536	7.6057
22,450	3.0253	5.4639	7.6200
22,500	3.0309	5.4741	7.6342
22,550	3.0366	5.4843	7.6485
22,600	3.0422	5.4945	7.6627
22,650	3.0479	5.5047	7.6770
22,700	3.0536	5.5149	7.6912
22,750	3.0592	5.5251	7.7054
22,800	3.0649	5.5354	7.7197
22,850	3.0705	5.5456	7.7339
22,900	3.0762	5.5558	7.7482
22,950	3.0818	5.5660	7.7624
23,000	3.0875	5.5762	7.7766
23,050	3.0931	5.5864	7.7909
23,100	3.0988	5.5966	7.8051
23,150	3.1044	5.6068	7.8194
23,200	3.1101	5.6170	7.8336
23,250	3.1157	5.6272	7.8478
23,300	3.1214	5.6374	7.8621
23,350	3.1270	5.6477	7.8763
23,400	3.1327	5.6579	7.8905
23,450	3.1384	5.6681	7.9048
23,500	3.1440	5.6783	7.9190
23,550	3.1497	5.6885	7.9332
23,600	3.1553	5.6987	7.9475
23,650	3.1610	5.7089	7.9617
23,700	3.1666	5.7191	7.9759
23,750	3.1723	5.7293	7.9902
23,800	3.1779	5.7395	8.0044
23,850	3.1836	5.7497	8.0186
23,900	3.1892	5.7599	8.0329
23,950	3.1949	5.7701	8.0471
24,000	3.2005	5.7803	8.0613
24,050	3.2062	5.7905	8.0756
24,100	3.2118	5.8007	8.0898
24,150	3.2175	5.8109	8.1040
24,200	3.2231	5.8211	8.1182
24,250	3.2287	5.8313	8.1325
24,300	3.2344	5.8415	8.1467
24,350	3.2400	5.8517	8.1609

Model:

SPF - Urban Flat, Rolling, and Mountainous 4-Lane Divided Freeways

Dispersion (Alpha) = 2.7573E-01

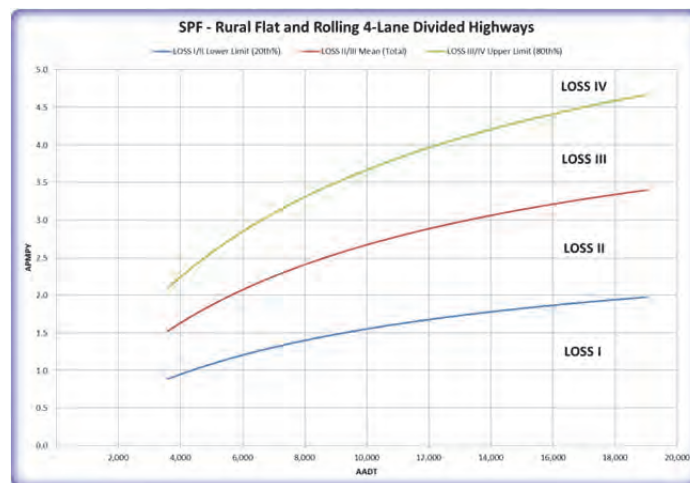
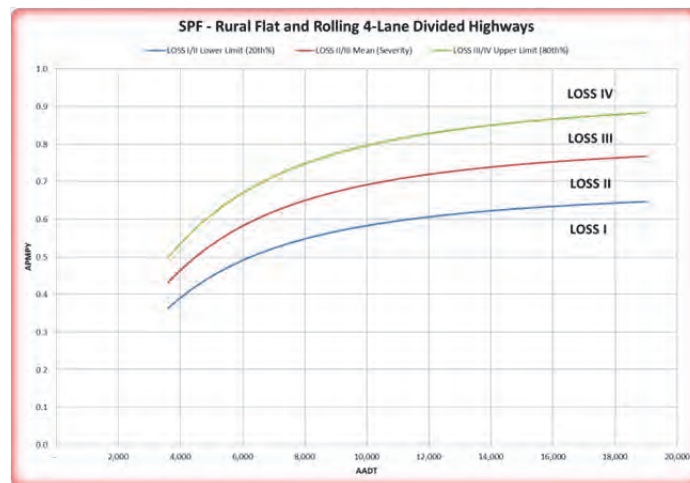
AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
24,400	3.2457	5.8619	8.1752
24,450	3.2513	5.8721	8.1894
24,500	3.2570	5.8823	8.2036
24,550	3.2626	5.8925	8.2178
24,600	3.2683	5.9027	8.2320
24,650	3.2739	5.9129	8.2463
24,700	3.2796	5.9231	8.2605
24,750	3.2852	5.9333	8.2747
24,800	3.2909	5.9435	8.2889
24,850	3.2965	5.9537	8.3032
24,900	3.3022	5.9639	8.3174
24,950	3.3078	5.9741	8.3316
25,000	3.3135	5.9843	8.3458
25,050	3.3191	5.9945	8.3600
25,100	3.3247	6.0047	8.3743
25,150	3.3304	6.0149	8.3885
25,200	3.3360	6.0251	8.4027
25,250	3.3417	6.0353	8.4169
25,300	3.3473	6.0455	8.4311
25,350	3.3530	6.0557	8.4454
25,400	3.3586	6.0659	8.4596
25,450	3.3643	6.0761	8.4738
25,500	3.3699	6.0863	8.4880
25,550	3.3755	6.0965	8.5022
25,600	3.3812	6.1066	8.5164
25,650	3.3868	6.1168	8.5306
25,700	3.3925	6.1270	8.5449
25,750	3.3981	6.1372	8.5591
25,800	3.4038	6.1474	8.5733
25,850	3.4094	6.1576	8.5875
25,900	3.4150	6.1678	8.6017
25,950	3.4207	6.1780	8.6159
26,000	3.4263	6.1882	8.6301
26,050	3.4320	6.1984	8.6443
26,100	3.4376	6.2086	8.6585
26,150	3.4433	6.2187	8.6728
26,200	3.4489	6.2289	8.6870

Montana Urban Flat, Rolling, and Mountainous 4-Lane Divided Freeways								
Description	0 - 0 ADT		0 - 15000 ADT		> 15000 ADT		All Totals	
	Accidents	Percent	Accidents	Percent	Accidents	Percent	Accidents	Percent
Severity								
PDO	0		291	77.60%	476	74.38%	767	75.57%
INJ	0		78	20.80%	148	23.13%	226	22.27%
FAT	0		6	1.60%	16	2.50%	22	2.17%
Persons Injured	0		125	N/A	195	N/A	320	N/A
Persons Killed	0		6	N/A	17	N/A	23	N/A
Number of Vehicles								
Single Vehicle Accidents	0		310	82.67%	464	72.50%	774	76.26%
Two Vehicle Accidents	0		61	16.27%	162	25.31%	223	21.97%
Three or more Vehicle Accident	0		4	1.07%	14	2.19%	18	1.77%
Unknown Number of Vehicles	0		0	0.00%	0	0.00%	0	0.00%
Location								
On Road	0		220	58.67%	394	61.56%	614	60.49%
Off Road	0		88	23.47%	144	22.50%	232	22.86%
Off Road Left	0		41	10.93%	79	12.34%	120	11.82%
Off Road Right	0		47	12.53%	65	10.16%	112	11.03%
Off Road at Tee	0		0	0.00%	0	0.00%	0	0.00%
Off Road in Median	0		0	0.00%	0	0.00%	0	0.00%
Unknown Road Location	0		67	17.87%	102	15.94%	169	16.65%
Accident Type								
Overturning	0		66	17.60%	104	16.25%	170	16.75%
Other Non Collision	0		17	4.53%	33	5.16%	50	4.93%
School Age Pedestrians	0		0	0.00%	0	0.00%	0	0.00%
All Other Pedestrians	0		0	0.00%	3	0.47%	3	0.30%
Broadside	0		7	1.87%	11	1.72%	18	1.77%
Head On	0		5	1.33%	6	0.94%	11	1.08%
Rear End	0		24	6.40%	72	11.25%	96	9.46%
Sideswipe (Same Direction)	0		16	4.27%	65	10.16%	81	7.98%
Sideswipe (Opposite Direction)	0		3	0.80%	5	0.78%	8	0.79%
Approach Turn	0		0	0.00%	1	0.16%	1	0.10%
Overtaking Turn	0		0	0.00%	0	0.00%	0	0.00%
Parked Motor Vehicle	0		1	0.27%	4	0.63%	5	0.49%
Railway Vehicle	0		0	0.00%	0	0.00%	0	0.00%
Bicycle	0		0	0.00%	0	0.00%	0	0.00%
Motorized Bicycle	0		0	0.00%	0	0.00%	0	0.00%
Domestic Animal	0		2	0.53%	5	0.78%	7	0.69%
Wild Animal	0		86	22.93%	81	12.66%	167	16.45%
Light or Utility Pole	0		8	2.13%	13	2.03%	21	2.07%
Traffic Signal Pole	0		0	0.00%	0	0.00%	0	0.00%
Sign	0		2	0.53%	11	1.72%	13	1.28%
Bridge Rail	0		8	2.13%	17	2.66%	25	2.46%
Guard Rail	0		76	20.27%	109	17.03%	185	18.23%
Cable Rail	0		0	0.00%	0	0.00%	0	0.00%
Median Barrier	0		6	1.60%	15	2.34%	21	2.07%
Bridge Abutment	0		0	0.00%	0	0.00%	0	0.00%
Column or Pier	0		1	0.27%	0	0.00%	3	0.30%
Culvert or Headwall	0		2	0.53%	1	0.16%	3	0.30%
Embankment	0		11	2.93%	16	2.50%	27	2.66%
Curb	0		0	0.00%	1	0.16%	1	0.10%
Delineator Post	0		0	0.00%	0	0.00%	0	0.00%
Fence	0		10	2.67%	30	4.69%	40	3.94%
Tree	0		2	0.53%	0	0.00%	2	0.20%
Large Boulder	0		0	0.00%	0	0.00%	0	0.00%
Rocks in Roadway	0		0	0.00%	0	0.00%	0	0.00%
Barricade	0		0	0.00%	0	0.00%	0	0.00%
Wall or Building	0		0	0.00%	0	0.00%	0	0.00%
Crash Cushion	0		1	0.27%	0	0.00%	1	0.10%
Mailbox	0		0	0.00%	0	0.00%	0	0.00%
Other Fixed Object	0		6	1.60%	14	2.19%	20	1.97%
Involving Other Object	0		9	2.40%	15	2.34%	24	2.36%
Road Maintenance Equipment	0		0	0.00%	0	0.00%	0	0.00%
Unknown Accident Type	0		6	1.60%	6	0.94%	12	1.18%
Total Fixed Objects	0		133	35.47%	229	35.78%	362	35.67%
Total Other Objects	0		9	2.40%	15	2.34%	24	2.36%

Montana Urban Flat, Rolling, and Mountainous 4-Lane Divided Freeways								
Description	0 - 0 ADT		0 - 15000 ADT		> 15000 ADT		All Totals	
	Accidents	Percent	Accidents	Percent	Accidents	Percent	Accidents	Percent
Lighting								
Daylight	0		199	53.07%	358	55.94%	557	54.88%
Dawn or Dusk	0		18	4.80%	33	5.16%	51	5.02%
Dark - Lighted	0		33	8.80%	51	7.97%	84	8.28%
Dark - Unlighted	0		125	33.33%	197	30.78%	322	31.72%
Unknown Lighting	0		0	0.00%	1	0.16%	1	0.10%
Weather								
No Adverse Weather	0		288	76.80%	454	70.94%	742	73.10%
Rain	0		11	2.93%	17	2.66%	28	2.76%
Snow or Sleet or Hail	0		73	19.47%	167	26.09%	240	23.65%
Fog	0		3	0.80%	2	0.31%	5	0.49%
Dust	0		0	0.00%	0	0.00%	0	0.00%
Wind	0		0	0.00%	0	0.00%	0	0.00%
Unknown Weather	0		0	0.00%	0	0.00%	0	0.00%
Road Condition								
Dry Road	0		229	61.07%	333	52.03%	562	55.37%
Wet Road	0		20	5.33%	44	6.88%	64	6.31%
Muddy Road	0		0	0.00%	0	0.00%	0	0.00%
Snowy Road	0		53	14.13%	116	18.13%	169	16.65%
Icy Road	0		72	19.20%	145	22.66%	217	21.38%
Slushy Road	0		0	0.00%	0	0.00%	0	0.00%
Foreign Material Road	0		0	0.00%	0	0.00%	0	0.00%
With Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Dry with Icy Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Wet with Icy Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Snowy with Icy Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Icy with Icy Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Slushy with Icy Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Unknown Road Condition	0		1	0.27%	2	0.31%	3	0.30%
Contributing Factor								
No Apparent Contributing Factor	0		69	18.40%	77	12.03%	146	14.38%
Asleep at the Wheel	0		7	1.87%	8	1.25%	15	1.48%
Illness	0		0	0.00%	0	0.00%	0	0.00%
Distracted by Passenger	0		0	0.00%	0	0.00%	0	0.00%
Driver Inexperience	0		0	0.00%	0	0.00%	0	0.00%
Driver Fatigue	0		0	0.00%	0	0.00%	0	0.00%
Driver Preoccupied	0		23	6.13%	36	5.63%	59	5.81%
Driver Unfamiliar with Area	0		0	0.00%	0	0.00%	0	0.00%
Driver Emotionally Upset	0		0	0.00%	0	0.00%	0	0.00%
Evading Law Enforcement Officer	0		0	0.00%	0	0.00%	0	0.00%
Physical Disability	0		0	0.00%	0	0.00%	0	0.00%
Unknown Contributing Factor	0		276	73.60%	519	81.09%	795	78.33%
Condition of Driver								
No Impairment Suspected	0		322	85.87%	569	88.91%	891	87.78%
Alcohol Involved	0		34	9.07%	46	7.19%	80	7.88%
RX Drugs or Medication Involved	0		0	0.00%	0	0.00%	0	0.00%
Illegal Drugs Involved	0		2	0.53%	5	0.78%	7	0.69%
Alcohol and Drugs Involved	0		5	1.33%	7	1.09%	12	1.18%
Driver/Pedestrian Not Observed	0		4	1.07%	2	0.31%	6	0.59%
Unknown Condition	0		8	2.13%	11	1.72%	19	1.87%
Total Accidents:	0		375	36.95%	640	63.05%	1,015	100.00%

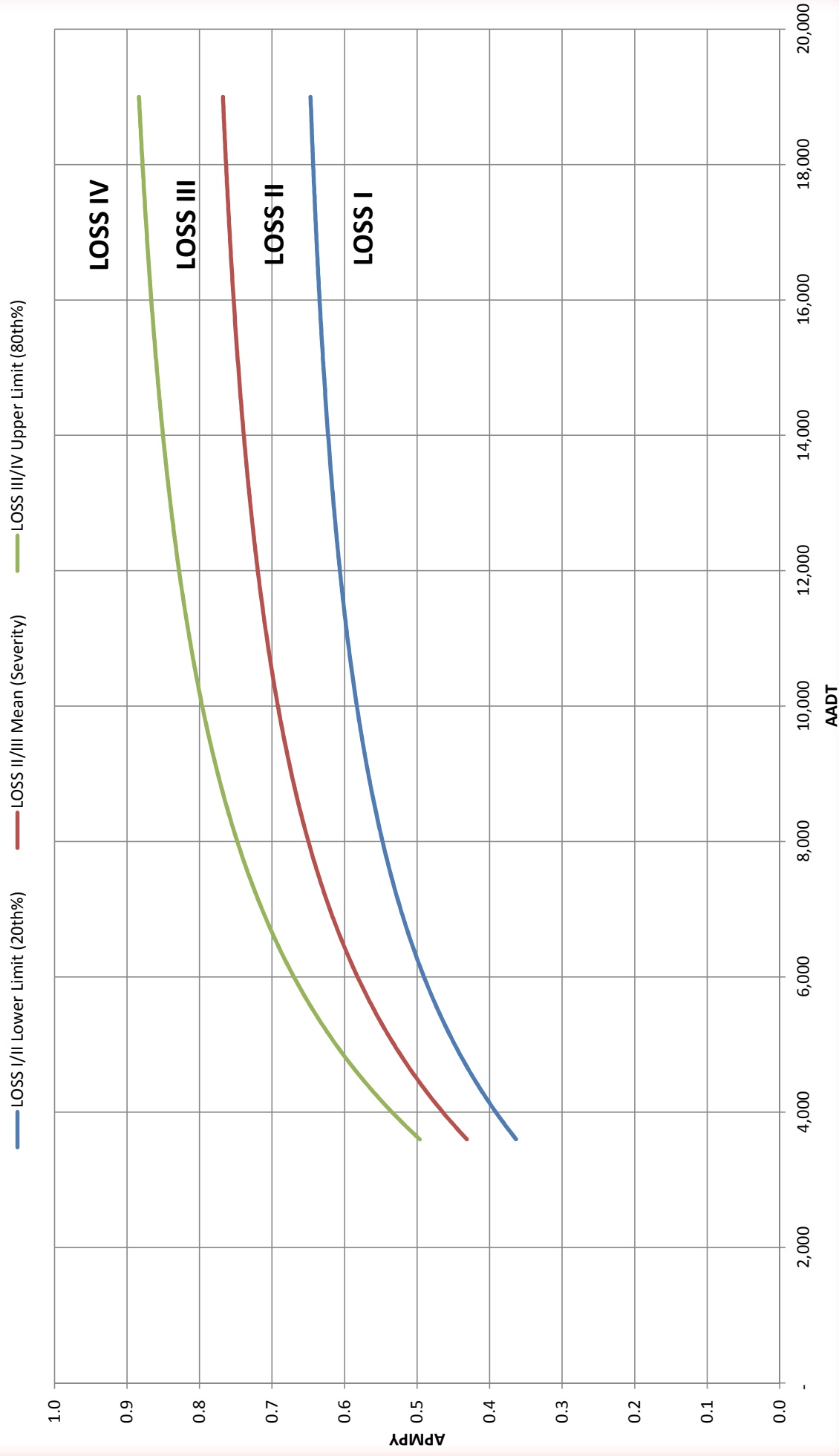


Montana Rural Flat and Rolling 4-Lane Divided Highways



SPF, LOSS, and Diagnostic Norms

SPF - Rural Flat and Rolling 4-Lane Divided Highways



Model:

SPF - Rural Flat and Rolling 4-Lane Divided Highways

Dispersion (Alpha) = 3.3911E-02

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
3,600	0.3635	0.4313	0.4964
3,650	0.3671	0.4357	0.5014
3,700	0.3708	0.4400	0.5063
3,750	0.3743	0.4442	0.5112
3,800	0.3778	0.4484	0.5160
3,850	0.3813	0.4525	0.5207
3,900	0.3847	0.4565	0.5254
3,950	0.3881	0.4605	0.5300
4,000	0.3914	0.4644	0.5345
4,050	0.3946	0.4683	0.5389
4,100	0.3978	0.4721	0.5433
4,150	0.4010	0.4759	0.5476
4,200	0.4041	0.4796	0.5519
4,250	0.4072	0.4832	0.5561
4,300	0.4102	0.4868	0.5602
4,350	0.4132	0.4903	0.5643
4,400	0.4161	0.4938	0.5683
4,450	0.4190	0.4972	0.5722
4,500	0.4218	0.5006	0.5761
4,550	0.4246	0.5039	0.5799
4,600	0.4274	0.5072	0.5837
4,650	0.4301	0.5105	0.5874
4,700	0.4328	0.5136	0.5911
4,750	0.4355	0.5168	0.5947
4,800	0.4381	0.5199	0.5982
4,850	0.4406	0.5229	0.6017
4,900	0.4432	0.5259	0.6052
4,950	0.4456	0.5289	0.6086
5,000	0.4481	0.5318	0.6120
5,050	0.4505	0.5346	0.6153
5,100	0.4529	0.5375	0.6185
5,150	0.4553	0.5403	0.6217
5,200	0.4576	0.5430	0.6249
5,250	0.4599	0.5457	0.6280
5,300	0.4621	0.5484	0.6311
5,350	0.4643	0.5510	0.6341
5,400	0.4665	0.5536	0.6371
5,450	0.4687	0.5562	0.6401
5,500	0.4708	0.5587	0.6430
5,550	0.4729	0.5612	0.6458
5,600	0.4750	0.5637	0.6486
5,650	0.4770	0.5661	0.6514
5,700	0.4790	0.5685	0.6542
5,750	0.4810	0.5708	0.6569

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Highways

Dispersion (Alpha) = 3.3911E-02

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
5,800	0.4830	0.5731	0.6595
5,850	0.4849	0.5754	0.6622
5,900	0.4868	0.5777	0.6648
5,950	0.4887	0.5799	0.6673
6,000	0.4905	0.5821	0.6699
6,050	0.4923	0.5843	0.6724
6,100	0.4941	0.5864	0.6748
6,150	0.4959	0.5885	0.6772
6,200	0.4977	0.5906	0.6796
6,250	0.4994	0.5926	0.6820
6,300	0.5011	0.5947	0.6843
6,350	0.5028	0.5966	0.6866
6,400	0.5044	0.5986	0.6889
6,450	0.5061	0.6006	0.6911
6,500	0.5077	0.6025	0.6933
6,550	0.5093	0.6044	0.6955
6,600	0.5108	0.6062	0.6976
6,650	0.5124	0.6081	0.6998
6,700	0.5139	0.6099	0.7019
6,750	0.5154	0.6117	0.7039
6,800	0.5169	0.6135	0.7060
6,850	0.5184	0.6152	0.7080
6,900	0.5199	0.6169	0.7100
6,950	0.5213	0.6186	0.7119
7,000	0.5227	0.6203	0.7139
7,050	0.5241	0.6220	0.7158
7,100	0.5255	0.6236	0.7177
7,150	0.5269	0.6252	0.7195
7,200	0.5282	0.6268	0.7214
7,250	0.5295	0.6284	0.7232
7,300	0.5309	0.6300	0.7250
7,350	0.5322	0.6315	0.7267
7,400	0.5334	0.6330	0.7285
7,450	0.5347	0.6345	0.7302
7,500	0.5360	0.6360	0.7319
7,550	0.5372	0.6375	0.7336
7,600	0.5384	0.6389	0.7353
7,650	0.5396	0.6404	0.7369
7,700	0.5408	0.6418	0.7386
7,750	0.5420	0.6432	0.7402
7,800	0.5431	0.6446	0.7417
7,850	0.5443	0.6459	0.7433
7,900	0.5454	0.6473	0.7449
7,950	0.5465	0.6486	0.7464

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Highways

Dispersion (Alpha) = 3.3911E-02

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
8,000	0.5476	0.6499	0.7479
8,050	0.5487	0.6512	0.7494
8,100	0.5498	0.6525	0.7509
8,150	0.5509	0.6538	0.7523
8,200	0.5519	0.6550	0.7538
8,250	0.5530	0.6563	0.7552
8,300	0.5540	0.6575	0.7566
8,350	0.5550	0.6587	0.7580
8,400	0.5561	0.6599	0.7594
8,450	0.5570	0.6611	0.7607
8,500	0.5580	0.6622	0.7621
8,550	0.5590	0.6634	0.7634
8,600	0.5600	0.6645	0.7647
8,650	0.5609	0.6657	0.7660
8,700	0.5619	0.6668	0.7673
8,750	0.5628	0.6679	0.7686
8,800	0.5637	0.6690	0.7698
8,850	0.5646	0.6701	0.7711
8,900	0.5655	0.6711	0.7723
8,950	0.5664	0.6722	0.7735
9,000	0.5673	0.6732	0.7747
9,050	0.5682	0.6743	0.7759
9,100	0.5690	0.6753	0.7771
9,150	0.5699	0.6763	0.7783
9,200	0.5707	0.6773	0.7794
9,250	0.5716	0.6783	0.7805
9,300	0.5724	0.6793	0.7817
9,350	0.5732	0.6802	0.7828
9,400	0.5740	0.6812	0.7839
9,450	0.5748	0.6821	0.7850
9,500	0.5756	0.6831	0.7861
9,550	0.5764	0.6840	0.7871
9,600	0.5771	0.6849	0.7882
9,650	0.5779	0.6858	0.7892
9,700	0.5787	0.6867	0.7903
9,750	0.5794	0.6876	0.7913
9,800	0.5802	0.6885	0.7923
9,850	0.5809	0.6894	0.7933
9,900	0.5816	0.6902	0.7943
9,950	0.5823	0.6911	0.7953
10,000	0.5830	0.6919	0.7962
10,050	0.5837	0.6927	0.7972
10,100	0.5844	0.6936	0.7981
10,150	0.5851	0.6944	0.7991

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Highways

Dispersion (Alpha) = 3.3911E-02

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
10,200	0.5858	0.6952	0.8000
10,250	0.5865	0.6960	0.8009
10,300	0.5872	0.6968	0.8019
10,350	0.5878	0.6976	0.8028
10,400	0.5885	0.6984	0.8036
10,450	0.5891	0.6991	0.8045
10,500	0.5898	0.6999	0.8054
10,550	0.5904	0.7006	0.8063
10,600	0.5910	0.7014	0.8071
10,650	0.5916	0.7021	0.8080
10,700	0.5923	0.7029	0.8088
10,750	0.5929	0.7036	0.8097
10,800	0.5935	0.7043	0.8105
10,850	0.5941	0.7050	0.8113
10,900	0.5947	0.7057	0.8121
10,950	0.5953	0.7064	0.8129
11,000	0.5958	0.7071	0.8137
11,050	0.5964	0.7078	0.8145
11,100	0.5970	0.7085	0.8153
11,150	0.5976	0.7091	0.8161
11,200	0.5981	0.7098	0.8168
11,250	0.5987	0.7105	0.8176
11,300	0.5992	0.7111	0.8183
11,350	0.5998	0.7118	0.8191
11,400	0.6003	0.7124	0.8198
11,450	0.6008	0.7130	0.8205
11,500	0.6014	0.7137	0.8213
11,550	0.6019	0.7143	0.8220
11,600	0.6024	0.7149	0.8227
11,650	0.6029	0.7155	0.8234
11,700	0.6034	0.7161	0.8241
11,750	0.6039	0.7167	0.8248
11,800	0.6044	0.7173	0.8255
11,850	0.6049	0.7179	0.8261
11,900	0.6054	0.7185	0.8268
11,950	0.6059	0.7191	0.8275
12,000	0.6064	0.7196	0.8281
12,050	0.6069	0.7202	0.8288
12,100	0.6074	0.7208	0.8294
12,150	0.6078	0.7213	0.8301
12,200	0.6083	0.7219	0.8307
12,250	0.6088	0.7224	0.8314
12,300	0.6092	0.7230	0.8320
12,350	0.6097	0.7235	0.8326

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Highways

Dispersion (Alpha) = 3.3911E-02

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
12,400	0.6101	0.7240	0.8332
12,450	0.6106	0.7246	0.8338
12,500	0.6110	0.7251	0.8344
12,550	0.6114	0.7256	0.8350
12,600	0.6119	0.7261	0.8356
12,650	0.6123	0.7266	0.8362
12,700	0.6127	0.7271	0.8368
12,750	0.6132	0.7277	0.8374
12,800	0.6136	0.7281	0.8379
12,850	0.6140	0.7286	0.8385
12,900	0.6144	0.7291	0.8391
12,950	0.6148	0.7296	0.8396
13,000	0.6152	0.7301	0.8402
13,050	0.6156	0.7306	0.8407
13,100	0.6160	0.7310	0.8413
13,150	0.6164	0.7315	0.8418
13,200	0.6168	0.7320	0.8423
13,250	0.6172	0.7324	0.8429
13,300	0.6176	0.7329	0.8434
13,350	0.6180	0.7334	0.8439
13,400	0.6183	0.7338	0.8444
13,450	0.6187	0.7342	0.8450
13,500	0.6191	0.7347	0.8455
13,550	0.6195	0.7351	0.8460
13,600	0.6198	0.7356	0.8465
13,650	0.6202	0.7360	0.8470
13,700	0.6206	0.7364	0.8475
13,750	0.6209	0.7369	0.8480
13,800	0.6213	0.7373	0.8484
13,850	0.6216	0.7377	0.8489
13,900	0.6220	0.7381	0.8494
13,950	0.6223	0.7385	0.8499
14,000	0.6227	0.7389	0.8503
14,050	0.6230	0.7393	0.8508
14,100	0.6233	0.7397	0.8513
14,150	0.6237	0.7401	0.8517
14,200	0.6240	0.7405	0.8522
14,250	0.6243	0.7409	0.8526
14,300	0.6247	0.7413	0.8531
14,350	0.6250	0.7417	0.8535
14,400	0.6253	0.7421	0.8540
14,450	0.6256	0.7425	0.8544
14,500	0.6259	0.7428	0.8548
14,550	0.6263	0.7432	0.8553

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Highways

Dispersion (Alpha) = 3.3911E-02

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
14,600	0.6266	0.7436	0.8557
14,650	0.6269	0.7439	0.8561
14,700	0.6272	0.7443	0.8565
14,750	0.6275	0.7447	0.8570
14,800	0.6278	0.7450	0.8574
14,850	0.6281	0.7454	0.8578
14,900	0.6284	0.7457	0.8582
14,950	0.6287	0.7461	0.8586
15,000	0.6290	0.7464	0.8590
15,050	0.6293	0.7468	0.8594
15,100	0.6296	0.7471	0.8598
15,150	0.6299	0.7475	0.8602
15,200	0.6302	0.7478	0.8606
15,250	0.6304	0.7482	0.8610
15,300	0.6307	0.7485	0.8613
15,350	0.6310	0.7488	0.8617
15,400	0.6313	0.7491	0.8621
15,450	0.6315	0.7495	0.8625
15,500	0.6318	0.7498	0.8629
15,550	0.6321	0.7501	0.8632
15,600	0.6324	0.7504	0.8636
15,650	0.6326	0.7508	0.8640
15,700	0.6329	0.7511	0.8643
15,750	0.6332	0.7514	0.8647
15,800	0.6334	0.7517	0.8650
15,850	0.6337	0.7520	0.8654
15,900	0.6339	0.7523	0.8657
15,950	0.6342	0.7526	0.8661
16,000	0.6344	0.7529	0.8664
16,050	0.6347	0.7532	0.8668
16,100	0.6349	0.7535	0.8671
16,150	0.6352	0.7538	0.8675
16,200	0.6354	0.7541	0.8678
16,250	0.6357	0.7544	0.8681
16,300	0.6359	0.7547	0.8685
16,350	0.6362	0.7550	0.8688
16,400	0.6364	0.7552	0.8691
16,450	0.6367	0.7555	0.8694
16,500	0.6369	0.7558	0.8698
16,550	0.6371	0.7561	0.8701
16,600	0.6374	0.7564	0.8704
16,650	0.6376	0.7566	0.8707
16,700	0.6378	0.7569	0.8710
16,750	0.6380	0.7572	0.8714

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Highways

Dispersion (Alpha) = 3.3911E-02

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
16,800	0.6383	0.7575	0.8717
16,850	0.6385	0.7577	0.8720
16,900	0.6387	0.7580	0.8723
16,950	0.6389	0.7583	0.8726
17,000	0.6392	0.7585	0.8729
17,050	0.6394	0.7588	0.8732
17,100	0.6396	0.7590	0.8735
17,150	0.6398	0.7593	0.8738
17,200	0.6400	0.7595	0.8741
17,250	0.6402	0.7598	0.8744
17,300	0.6405	0.7601	0.8747
17,350	0.6407	0.7603	0.8749
17,400	0.6409	0.7605	0.8752
17,450	0.6411	0.7608	0.8755
17,500	0.6413	0.7610	0.8758
17,550	0.6415	0.7613	0.8761
17,600	0.6417	0.7615	0.8763
17,650	0.6419	0.7618	0.8766
17,700	0.6421	0.7620	0.8769
17,750	0.6423	0.7622	0.8772
17,800	0.6425	0.7625	0.8774
17,850	0.6427	0.7627	0.8777
17,900	0.6429	0.7629	0.8780
17,950	0.6431	0.7632	0.8782
18,000	0.6433	0.7634	0.8785
18,050	0.6435	0.7636	0.8788
18,100	0.6437	0.7639	0.8790
18,150	0.6439	0.7641	0.8793
18,200	0.6440	0.7643	0.8796
18,250	0.6442	0.7645	0.8798
18,300	0.6444	0.7648	0.8801
18,350	0.6446	0.7650	0.8803
18,400	0.6448	0.7652	0.8806
18,450	0.6450	0.7654	0.8808
18,500	0.6452	0.7656	0.8811
18,550	0.6453	0.7658	0.8813
18,600	0.6455	0.7660	0.8816
18,650	0.6457	0.7663	0.8818
18,700	0.6459	0.7665	0.8820
18,750	0.6460	0.7667	0.8823
18,800	0.6462	0.7669	0.8825
18,850	0.6464	0.7671	0.8828
18,900	0.6466	0.7673	0.8830
18,950	0.6467	0.7675	0.8832

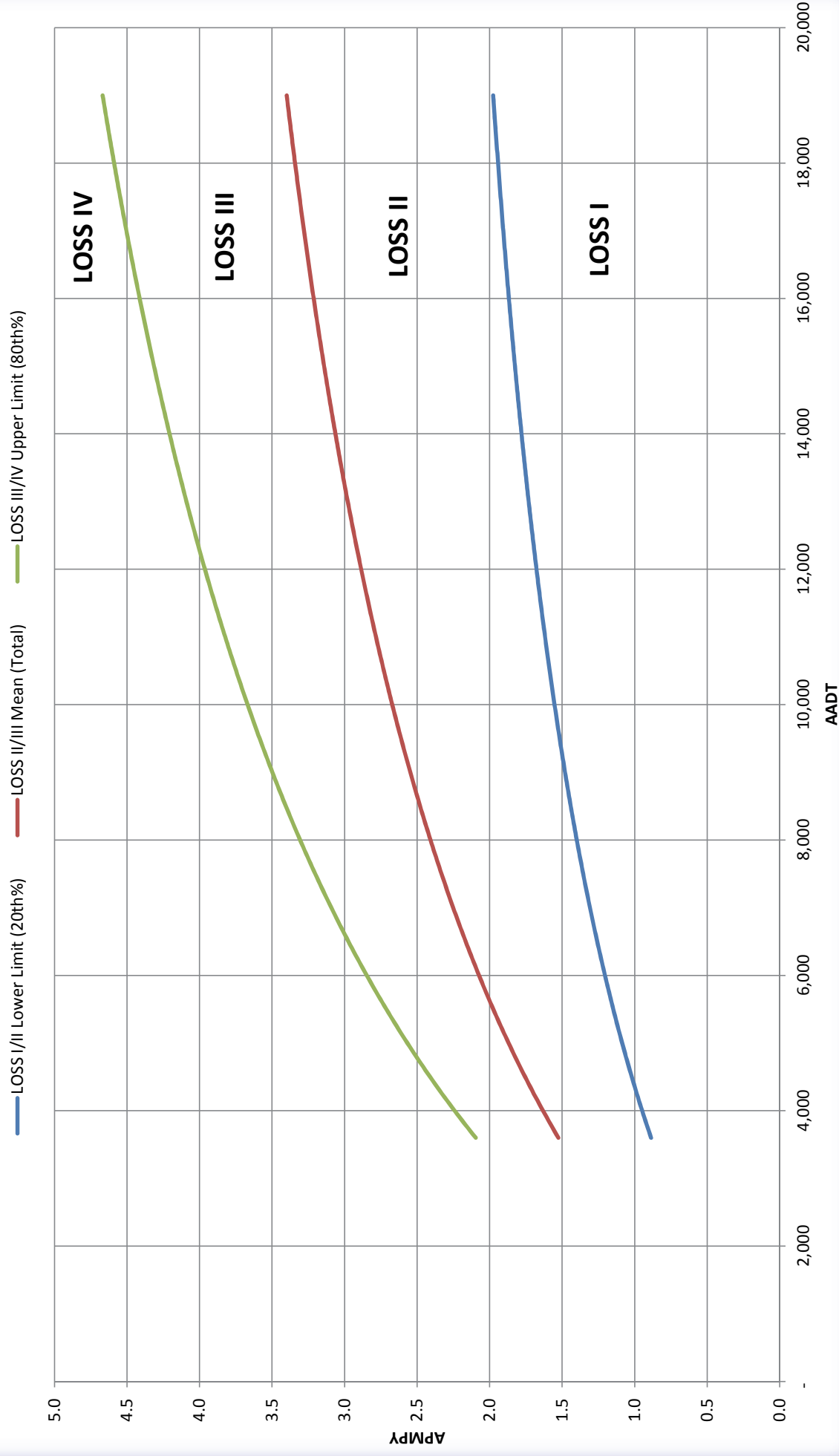
Model:

SPF - Rural Flat and Rolling 4-Lane Divided Highways

Dispersion (Alpha) = 3.3911E-02

<u>AADT</u>	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Severity)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
19,000	0.6469	0.7677	0.8835

SPF - Rural Flat and Rolling 4-Lane Divided Highways



Model:

SPF - Rural Flat and Rolling 4-Lane Divided Highways

Dispersion (Alpha) = 2.4162E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
3,600	0.8868	1.5259	2.0956
3,650	0.8947	1.5396	2.1144
3,700	0.9026	1.5531	2.1330
3,750	0.9104	1.5666	2.1514
3,800	0.9181	1.5799	2.1697
3,850	0.9258	1.5931	2.1879
3,900	0.9334	1.6062	2.2059
3,950	0.9410	1.6192	2.2237
4,000	0.9485	1.6321	2.2414
4,050	0.9559	1.6449	2.2589
4,100	0.9633	1.6575	2.2763
4,150	0.9706	1.6701	2.2936
4,200	0.9778	1.6826	2.3107
4,250	0.9850	1.6949	2.3277
4,300	0.9921	1.7072	2.3446
4,350	0.9992	1.7194	2.3613
4,400	1.0062	1.7314	2.3779
4,450	1.0132	1.7434	2.3943
4,500	1.0201	1.7553	2.4106
4,550	1.0269	1.7671	2.4268
4,600	1.0337	1.7788	2.4429
4,650	1.0405	1.7904	2.4588
4,700	1.0472	1.8019	2.4746
4,750	1.0538	1.8133	2.4903
4,800	1.0604	1.8247	2.5059
4,850	1.0669	1.8359	2.5214
4,900	1.0734	1.8471	2.5367
4,950	1.0799	1.8582	2.5519
5,000	1.0863	1.8692	2.5670
5,050	1.0926	1.8801	2.5820
5,100	1.0989	1.8910	2.5969
5,150	1.1052	1.9017	2.6117
5,200	1.1114	1.9124	2.6264
5,250	1.1175	1.9230	2.6409
5,300	1.1236	1.9335	2.6554
5,350	1.1297	1.9440	2.6697
5,400	1.1357	1.9543	2.6840
5,450	1.1417	1.9646	2.6981
5,500	1.1477	1.9749	2.7122
5,550	1.1536	1.9850	2.7261
5,600	1.1594	1.9951	2.7399
5,650	1.1652	2.0051	2.7537
5,700	1.1710	2.0150	2.7673
5,750	1.1768	2.0249	2.7809

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Highways

Dispersion (Alpha) = 2.4162E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
5,800	1.1825	2.0347	2.7943
5,850	1.1881	2.0444	2.8077
5,900	1.1937	2.0541	2.8210
5,950	1.1993	2.0637	2.8342
6,000	1.2048	2.0732	2.8472
6,050	1.2103	2.0827	2.8602
6,100	1.2158	2.0921	2.8732
6,150	1.2212	2.1014	2.8860
6,200	1.2266	2.1107	2.8987
6,250	1.2320	2.1199	2.9114
6,300	1.2373	2.1291	2.9239
6,350	1.2426	2.1382	2.9364
6,400	1.2478	2.1472	2.9488
6,450	1.2530	2.1562	2.9611
6,500	1.2582	2.1651	2.9734
6,550	1.2634	2.1739	2.9855
6,600	1.2685	2.1827	2.9976
6,650	1.2735	2.1915	3.0096
6,700	1.2786	2.2001	3.0215
6,750	1.2836	2.2088	3.0334
6,800	1.2886	2.2173	3.0451
6,850	1.2935	2.2258	3.0568
6,900	1.2984	2.2343	3.0684
6,950	1.3033	2.2427	3.0800
7,000	1.3082	2.2511	3.0915
7,050	1.3130	2.2594	3.1029
7,100	1.3178	2.2676	3.1142
7,150	1.3226	2.2758	3.1254
7,200	1.3273	2.2839	3.1366
7,250	1.3320	2.2920	3.1477
7,300	1.3367	2.3001	3.1588
7,350	1.3413	2.3081	3.1698
7,400	1.3459	2.3160	3.1807
7,450	1.3505	2.3239	3.1915
7,500	1.3551	2.3318	3.2023
7,550	1.3596	2.3396	3.2130
7,600	1.3641	2.3473	3.2237
7,650	1.3686	2.3550	3.2342
7,700	1.3731	2.3627	3.2448
7,750	1.3775	2.3703	3.2552
7,800	1.3819	2.3779	3.2656
7,850	1.3862	2.3854	3.2759
7,900	1.3906	2.3929	3.2862
7,950	1.3949	2.4003	3.2964

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Highways

Dispersion (Alpha) = 2.4162E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
8,000	1.3992	2.4077	3.3066
8,050	1.4035	2.4150	3.3166
8,100	1.4077	2.4223	3.3267
8,150	1.4119	2.4296	3.3366
8,200	1.4161	2.4368	3.3466
8,250	1.4203	2.4440	3.3564
8,300	1.4244	2.4511	3.3662
8,350	1.4286	2.4582	3.3759
8,400	1.4327	2.4653	3.3856
8,450	1.4367	2.4723	3.3953
8,500	1.4408	2.4792	3.4048
8,550	1.4448	2.4862	3.4144
8,600	1.4488	2.4931	3.4238
8,650	1.4528	2.4999	3.4332
8,700	1.4568	2.5067	3.4426
8,750	1.4607	2.5135	3.4519
8,800	1.4646	2.5203	3.4612
8,850	1.4685	2.5270	3.4704
8,900	1.4724	2.5336	3.4795
8,950	1.4762	2.5402	3.4886
9,000	1.4801	2.5468	3.4977
9,050	1.4839	2.5534	3.5067
9,100	1.4877	2.5599	3.5156
9,150	1.4914	2.5664	3.5245
9,200	1.4952	2.5728	3.5334
9,250	1.4989	2.5793	3.5422
9,300	1.5026	2.5856	3.5509
9,350	1.5063	2.5920	3.5597
9,400	1.5100	2.5983	3.5683
9,450	1.5136	2.6046	3.5769
9,500	1.5172	2.6108	3.5855
9,550	1.5209	2.6170	3.5940
9,600	1.5244	2.6232	3.6025
9,650	1.5280	2.6293	3.6110
9,700	1.5316	2.6354	3.6193
9,750	1.5351	2.6415	3.6277
9,800	1.5386	2.6476	3.6360
9,850	1.5421	2.6536	3.6443
9,900	1.5456	2.6596	3.6525
9,950	1.5490	2.6655	3.6606
10,000	1.5525	2.6714	3.6688
10,050	1.5559	2.6773	3.6769
10,100	1.5593	2.6832	3.6849
10,150	1.5627	2.6890	3.6929

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Highways

Dispersion (Alpha) = 2.4162E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
10,200	1.5661	2.6948	3.7009
10,250	1.5694	2.7006	3.7088
10,300	1.5728	2.7063	3.7167
10,350	1.5761	2.7120	3.7245
10,400	1.5794	2.7177	3.7323
10,450	1.5827	2.7234	3.7401
10,500	1.5859	2.7290	3.7478
10,550	1.5892	2.7346	3.7555
10,600	1.5924	2.7401	3.7631
10,650	1.5956	2.7457	3.7708
10,700	1.5988	2.7512	3.7783
10,750	1.6020	2.7567	3.7859
10,800	1.6052	2.7621	3.7933
10,850	1.6084	2.7676	3.8008
10,900	1.6115	2.7730	3.8082
10,950	1.6146	2.7783	3.8156
11,000	1.6177	2.7837	3.8230
11,050	1.6208	2.7890	3.8303
11,100	1.6239	2.7943	3.8375
11,150	1.6270	2.7996	3.8448
11,200	1.6300	2.8048	3.8520
11,250	1.6330	2.8101	3.8592
11,300	1.6361	2.8153	3.8663
11,350	1.6391	2.8204	3.8734
11,400	1.6421	2.8256	3.8805
11,450	1.6450	2.8307	3.8875
11,500	1.6480	2.8358	3.8945
11,550	1.6509	2.8409	3.9015
11,600	1.6539	2.8459	3.9084
11,650	1.6568	2.8509	3.9153
11,700	1.6597	2.8559	3.9222
11,750	1.6626	2.8609	3.9290
11,800	1.6655	2.8659	3.9358
11,850	1.6683	2.8708	3.9426
11,900	1.6712	2.8757	3.9493
11,950	1.6740	2.8806	3.9560
12,000	1.6769	2.8855	3.9627
12,050	1.6797	2.8903	3.9694
12,100	1.6825	2.8951	3.9760
12,150	1.6853	2.8999	3.9826
12,200	1.6880	2.9047	3.9891
12,250	1.6908	2.9094	3.9956
12,300	1.6935	2.9142	4.0021
12,350	1.6963	2.9189	4.0086

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Highways

Dispersion (Alpha) = 2.4162E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
12,400	1.6990	2.9236	4.0150
12,450	1.7017	2.9282	4.0214
12,500	1.7044	2.9329	4.0278
12,550	1.7071	2.9375	4.0342
12,600	1.7098	2.9421	4.0405
12,650	1.7124	2.9467	4.0468
12,700	1.7151	2.9512	4.0530
12,750	1.7177	2.9558	4.0593
12,800	1.7204	2.9603	4.0655
12,850	1.7230	2.9648	4.0717
12,900	1.7256	2.9693	4.0778
12,950	1.7282	2.9737	4.0839
13,000	1.7307	2.9782	4.0900
13,050	1.7333	2.9826	4.0961
13,100	1.7359	2.9870	4.1021
13,150	1.7384	2.9914	4.1082
13,200	1.7409	2.9957	4.1142
13,250	1.7435	3.0001	4.1201
13,300	1.7460	3.0044	4.1261
13,350	1.7485	3.0087	4.1320
13,400	1.7510	3.0130	4.1379
13,450	1.7535	3.0173	4.1437
13,500	1.7559	3.0215	4.1496
13,550	1.7584	3.0257	4.1554
13,600	1.7608	3.0300	4.1611
13,650	1.7633	3.0341	4.1669
13,700	1.7657	3.0383	4.1726
13,750	1.7681	3.0425	4.1784
13,800	1.7705	3.0466	4.1840
13,850	1.7729	3.0507	4.1897
13,900	1.7753	3.0549	4.1953
13,950	1.7777	3.0589	4.2010
14,000	1.7800	3.0630	4.2066
14,050	1.7824	3.0671	4.2121
14,100	1.7848	3.0711	4.2177
14,150	1.7871	3.0751	4.2232
14,200	1.7894	3.0791	4.2287
14,250	1.7917	3.0831	4.2342
14,300	1.7940	3.0871	4.2396
14,350	1.7963	3.0910	4.2451
14,400	1.7986	3.0950	4.2505
14,450	1.8009	3.0989	4.2558
14,500	1.8032	3.1028	4.2612
14,550	1.8054	3.1067	4.2665

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Highways

Dispersion (Alpha) = 2.4162E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
14,600	1.8077	3.1106	4.2719
14,650	1.8099	3.1144	4.2772
14,700	1.8122	3.1183	4.2824
14,750	1.8144	3.1221	4.2877
14,800	1.8166	3.1259	4.2929
14,850	1.8188	3.1297	4.2981
14,900	1.8210	3.1335	4.3033
14,950	1.8232	3.1372	4.3085
15,000	1.8254	3.1410	4.3136
15,050	1.8275	3.1447	4.3188
15,100	1.8297	3.1484	4.3239
15,150	1.8318	3.1522	4.3290
15,200	1.8340	3.1558	4.3340
15,250	1.8361	3.1595	4.3391
15,300	1.8383	3.1632	4.3441
15,350	1.8404	3.1668	4.3491
15,400	1.8425	3.1705	4.3541
15,450	1.8446	3.1741	4.3591
15,500	1.8467	3.1777	4.3640
15,550	1.8488	3.1813	4.3689
15,600	1.8508	3.1848	4.3739
15,650	1.8529	3.1884	4.3787
15,700	1.8550	3.1919	4.3836
15,750	1.8570	3.1955	4.3885
15,800	1.8591	3.1990	4.3933
15,850	1.8611	3.2025	4.3981
15,900	1.8631	3.2060	4.4029
15,950	1.8652	3.2095	4.4077
16,000	1.8672	3.2129	4.4124
16,050	1.8692	3.2164	4.4172
16,100	1.8712	3.2198	4.4219
16,150	1.8732	3.2232	4.4266
16,200	1.8751	3.2267	4.4313
16,250	1.8771	3.2300	4.4360
16,300	1.8791	3.2334	4.4406
16,350	1.8810	3.2368	4.4452
16,400	1.8830	3.2402	4.4498
16,450	1.8849	3.2435	4.4544
16,500	1.8869	3.2468	4.4590
16,550	1.8888	3.2502	4.4636
16,600	1.8907	3.2535	4.4681
16,650	1.8927	3.2568	4.4727
16,700	1.8946	3.2601	4.4772
16,750	1.8965	3.2633	4.4817

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Highways

Dispersion (Alpha) = 2.4162E-01

AADT	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
16,800	1.8984	3.2666	4.4861
16,850	1.9002	3.2698	4.4906
16,900	1.9021	3.2731	4.4950
16,950	1.9040	3.2763	4.4995
17,000	1.9059	3.2795	4.5039
17,050	1.9077	3.2827	4.5083
17,100	1.9096	3.2859	4.5127
17,150	1.9114	3.2891	4.5170
17,200	1.9133	3.2922	4.5214
17,250	1.9151	3.2954	4.5257
17,300	1.9169	3.2985	4.5300
17,350	1.9187	3.3017	4.5343
17,400	1.9205	3.3048	4.5386
17,450	1.9224	3.3079	4.5429
17,500	1.9242	3.3110	4.5471
17,550	1.9259	3.3141	4.5513
17,600	1.9277	3.3171	4.5556
17,650	1.9295	3.3202	4.5598
17,700	1.9313	3.3233	4.5640
17,750	1.9331	3.3263	4.5681
17,800	1.9348	3.3293	4.5723
17,850	1.9366	3.3323	4.5764
17,900	1.9383	3.3354	4.5806
17,950	1.9401	3.3383	4.5847
18,000	1.9418	3.3413	4.5888
18,050	1.9435	3.3443	4.5929
18,100	1.9452	3.3473	4.5969
18,150	1.9470	3.3502	4.6010
18,200	1.9487	3.3532	4.6050
18,250	1.9504	3.3561	4.6091
18,300	1.9521	3.3590	4.6131
18,350	1.9538	3.3619	4.6171
18,400	1.9555	3.3648	4.6211
18,450	1.9571	3.3677	4.6250
18,500	1.9588	3.3706	4.6290
18,550	1.9605	3.3735	4.6330
18,600	1.9621	3.3764	4.6369
18,650	1.9638	3.3792	4.6408
18,700	1.9655	3.3821	4.6447
18,750	1.9671	3.3849	4.6486
18,800	1.9687	3.3877	4.6525
18,850	1.9704	3.3905	4.6563
18,900	1.9720	3.3933	4.6602
18,950	1.9736	3.3961	4.6640

Model:

SPF - Rural Flat and Rolling 4-Lane Divided Highways

Dispersion (Alpha) = 2.4162E-01

<u>AADT</u>	<u>LOSS I/II Lower Limit (20th%)</u>	<u>LOSS II/III Mean (Total)</u>	<u>LOSS III/IV Upper Limit (80th%)</u>
19,000	1.9753	3.3989	4.6679

Montana Rural Flat and Rolling 4-Lane Divided Highways								
Description	0 - 0 ADT		0 - 10000 ADT		> 10000 ADT		All Totals	
	Accidents	Percent	Accidents	Percent	Accidents	Percent	Accidents	Percent
Severity								
PDO	0		260	74.50%	187	73.91%	447	74.25%
INJ	0		86	24.64%	60	23.72%	146	24.25%
FAT	0		3	0.86%	6	2.37%	9	1.50%
Persons Injured	0		123	N/A	106	N/A	229	N/A
Persons Killed	0		3	N/A	7	N/A	10	N/A
Number of Vehicles								
Single Vehicle Accidents	0		271	77.65%	156	61.66%	427	70.93%
Two Vehicle Accidents	0		74	21.20%	81	32.02%	155	25.75%
Three or more Vehicle Accident	0		4	1.15%	16	6.32%	20	3.32%
Unknown Number of Vehicles	0		0	0.00%	0	0.00%	0	0.00%
Location								
On Road	0		237	67.91%	165	65.22%	402	66.78%
Off Road	0		44	12.61%	32	12.65%	76	12.62%
Off Road Left	0		16	4.58%	16	6.32%	32	5.32%
Off Road Right	0		28	8.02%	16	6.32%	44	7.31%
Off Road at Tee	0		0	0.00%	0	0.00%	0	0.00%
Off Road in Median	0		0	0.00%	0	0.00%	0	0.00%
Unknown Road Location	0		68	19.48%	56	22.13%	124	20.60%
Accident Type								
Overturning	0		35	10.03%	24	9.49%	59	9.80%
Other Non Collision	0		5	1.43%	7	2.77%	12	1.99%
School Age Pedestrians	0		0	0.00%	0	0.00%	0	0.00%
All Other Pedestrians	0		1	0.29%	0	0.00%	1	0.17%
Broadside	0		10	2.87%	14	5.53%	24	3.99%
Head On	0		7	2.01%	9	3.56%	16	2.66%
Rear End	0		25	7.16%	27	10.67%	52	8.64%
Sideswipe (Same Direction)	0		15	4.30%	26	10.28%	41	6.81%
Sideswipe (Opposite Direction)	0		7	2.01%	9	3.56%	16	2.66%
Approach Turn	0		5	1.43%	1	0.40%	6	1.00%
Overtaking Turn	0		0	0.00%	0	0.00%	0	0.00%
Parked Motor Vehicle	0		0	0.00%	3	1.19%	3	0.50%
Railway Vehicle	0		0	0.00%	0	0.00%	0	0.00%
Bicycle	0		0	0.00%	0	0.00%	0	0.00%
Motorized Bicycle	0		0	0.00%	0	0.00%	0	0.00%
Domestic Animal	0		5	1.43%	4	1.58%	9	1.50%
Wild Animal	0		157	44.99%	92	36.36%	249	41.36%
Light or Utility Pole	0		7	2.01%	3	1.19%	10	1.66%
Traffic Signal Pole	0		0	0.00%	0	0.00%	0	0.00%
Sign	0		8	2.29%	2	0.79%	10	1.66%
Bridge Rail	0		4	1.15%	0	0.00%	4	0.66%
Guard Rail	0		18	5.16%	2	0.79%	20	3.32%
Cable Rail	0		0	0.00%	0	0.00%	0	0.00%
Median Barrier	0		2	0.57%	0	0.00%	2	0.33%
Bridge Abutment	0		0	0.00%	0	0.00%	0	0.00%
Column or Pier	0		0	0.00%	0	0.00%	0	0.00%
Culvert or Headwall	0		0	0.00%	0	0.00%	0	0.00%
Embankment	0		11	3.15%	6	2.37%	17	2.82%
Curb	0		0	0.00%	0	0.00%	0	0.00%
Delineator Post	0		0	0.00%	0	0.00%	0	0.00%
Fence	0		6	1.72%	7	2.77%	13	2.16%
Tree	0		4	1.15%	1	0.40%	5	0.83%
Large Boulder	0		0	0.00%	0	0.00%	0	0.00%
Rocks in Roadway	0		0	0.00%	0	0.00%	0	0.00%
Barricade	0		0	0.00%	0	0.00%	0	0.00%
Wall or Building	0		0	0.00%	0	0.00%	0	0.00%
Crash Cushion	0		0	0.00%	0	0.00%	0	0.00%
Mailbox	0		0	0.00%	0	0.00%	0	0.00%
Other Fixed Object	0		7	2.01%	7	2.77%	14	2.33%
Involving Other Object	0		3	0.86%	4	1.58%	7	1.16%
Road Maintenance Equipment	0		0	0.00%	0	0.00%	0	0.00%
Unknown Accident Type	0		7	2.01%	5	1.98%	12	1.99%
Total Fixed Objects	0		67	19.20%	28	11.07%	95	15.78%
Total Other Objects	0		3	0.86%	4	1.58%	7	1.16%

Montana Rural Flat and Rolling 4-Lane Divided Highways								
Description	0 - 0 ADT		0 - 10000 ADT		> 10000 ADT		All Totals	
	Accidents	Percent	Accidents	Percent	Accidents	Percent	Accidents	Percent
Lighting								
Daylight	0		158	45.27%	114	45.06%	272	45.18%
Dawn or Dusk	0		21	6.02%	22	8.70%	43	7.14%
Dark - Lighted	0		31	8.88%	9	3.56%	40	6.64%
Dark - Unlighted	0		138	39.54%	108	42.69%	246	40.86%
Unknown Lighting	0		1	0.29%	0	0.00%	1	0.17%
Weather								
No Adverse Weather	0		291	83.38%	192	75.89%	483	80.23%
Rain	0		14	4.01%	15	5.93%	29	4.82%
Snow or Sleet or Hail	0		38	10.89%	46	18.18%	84	13.95%
Fog	0		4	1.15%	0	0.00%	4	0.66%
Dust	0		0	0.00%	0	0.00%	0	0.00%
Wind	0		1	0.29%	0	0.00%	1	0.17%
Unknown Weather	0		1	0.29%	0	0.00%	1	0.17%
Road Condition								
Dry Road	0		245	70.20%	152	60.08%	397	65.95%
Wet Road	0		43	12.32%	30	11.86%	73	12.13%
Muddy Road	0		0	0.00%	0	0.00%	0	0.00%
Snowy Road	0		28	8.02%	44	17.39%	72	11.96%
Icy Road	0		29	8.31%	27	10.67%	56	9.30%
Slushy Road	0		0	0.00%	0	0.00%	0	0.00%
Foreign Material Road	0		0	0.00%	0	0.00%	0	0.00%
With Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Dry with Icy Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Wet with Icy Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Snowy with Icy Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Icy with Icy Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Slushy with Icy Road Treatment	0		0	0.00%	0	0.00%	0	0.00%
Unknown Road Condition	0		4	1.15%	0	0.00%	4	0.66%
Contributing Factor								
No Apparent Contributing Factor	0		87	24.93%	57	22.53%	144	23.92%
Asleep at the Wheel	0		12	3.44%	8	3.16%	20	3.32%
Illness	0		0	0.00%	0	0.00%	0	0.00%
Distracted by Passenger	0		0	0.00%	1	0.40%	1	0.17%
Driver Inexperience	0		0	0.00%	0	0.00%	0	0.00%
Driver Fatigue	0		0	0.00%	0	0.00%	0	0.00%
Driver Preoccupied	0		9	2.58%	8	3.16%	17	2.82%
Driver Unfamiliar with Area	0		0	0.00%	0	0.00%	0	0.00%
Driver Emotionally Upset	0		0	0.00%	0	0.00%	0	0.00%
Evading Law Enforcement Officer	0		0	0.00%	0	0.00%	0	0.00%
Physical Disability	0		0	0.00%	0	0.00%	0	0.00%
Unknown Contributing Factor	0		241	69.05%	179	70.75%	420	69.77%
Condition of Driver								
No Impairment Suspected	0		308	88.25%	227	89.72%	535	88.87%
Alcohol Involved	0		20	5.73%	14	5.53%	34	5.65%
RX Drugs or Medication Involved	0		0	0.00%	0	0.00%	0	0.00%
Illegal Drugs Involved	0		4	1.15%	2	0.79%	6	1.00%
Alcohol and Drugs Involved	0		7	2.01%	1	0.40%	8	1.33%
Driver/Pedestrian Not Observed	0		0	0.00%	4	1.58%	4	0.66%
Unknown Condition	0		10	2.87%	5	1.98%	15	2.49%
Total Accidents:	0		349	57.97%	253	42.03%	602	100.00%



Technical Report and Documentation

Prepared by DiExSys, LLC
October 2013