VISION ZERO
zero deaths • zero serious injuries
MONTANA DEPARTMENT OF TRANSPORTATION

MDT's Safety Program

Overview, Challenges and New Tools

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Safety Engineer

Highway Safety Improvement Program (HSIP):

Purpose of achieving a significant reduction in fatalities and serious injuries on all public roads, including non-State-owned public roads and roads on Tribal lands.

- Data Driven – Projects identified based on crash experience, crash potential, or other data-supported means.
  - Site specific safety projects.
  - Systemic implementation of proven counter-measures thru projects and design guidance.

Highway Safety Improvement Program (HSIP):

- HSIP projects must be consistent with the CHSP.
- HSIP funding is eligible on ALL public roads
- Montana receives $18 M (+/-) annually.
  - 90% Federal Funds/10% State or Local Match

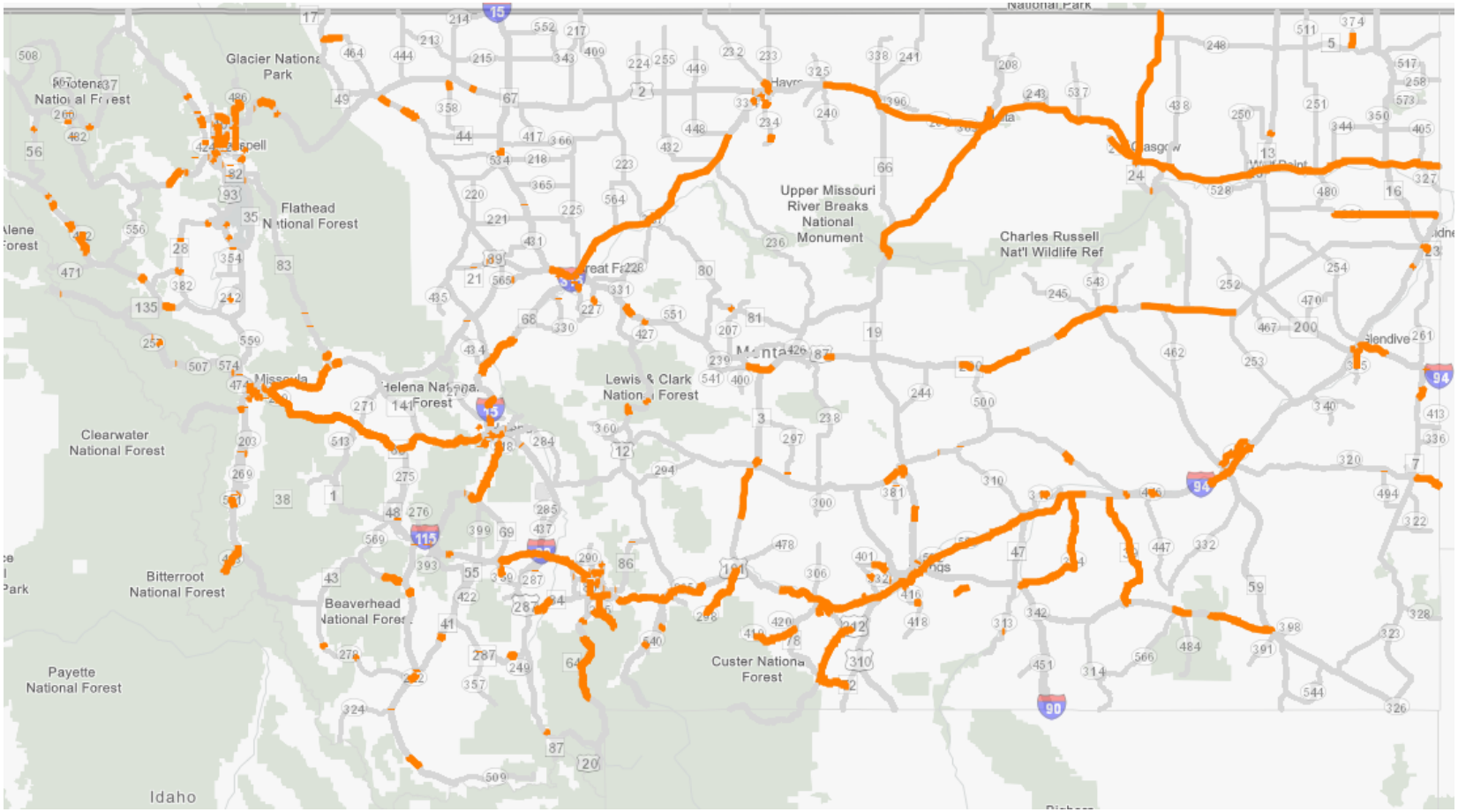
Highway Safety Improvement Program (HSIP):

- In 2017, 75 (+/-) identified sites that met criteria and minimum benefit/cost threshold

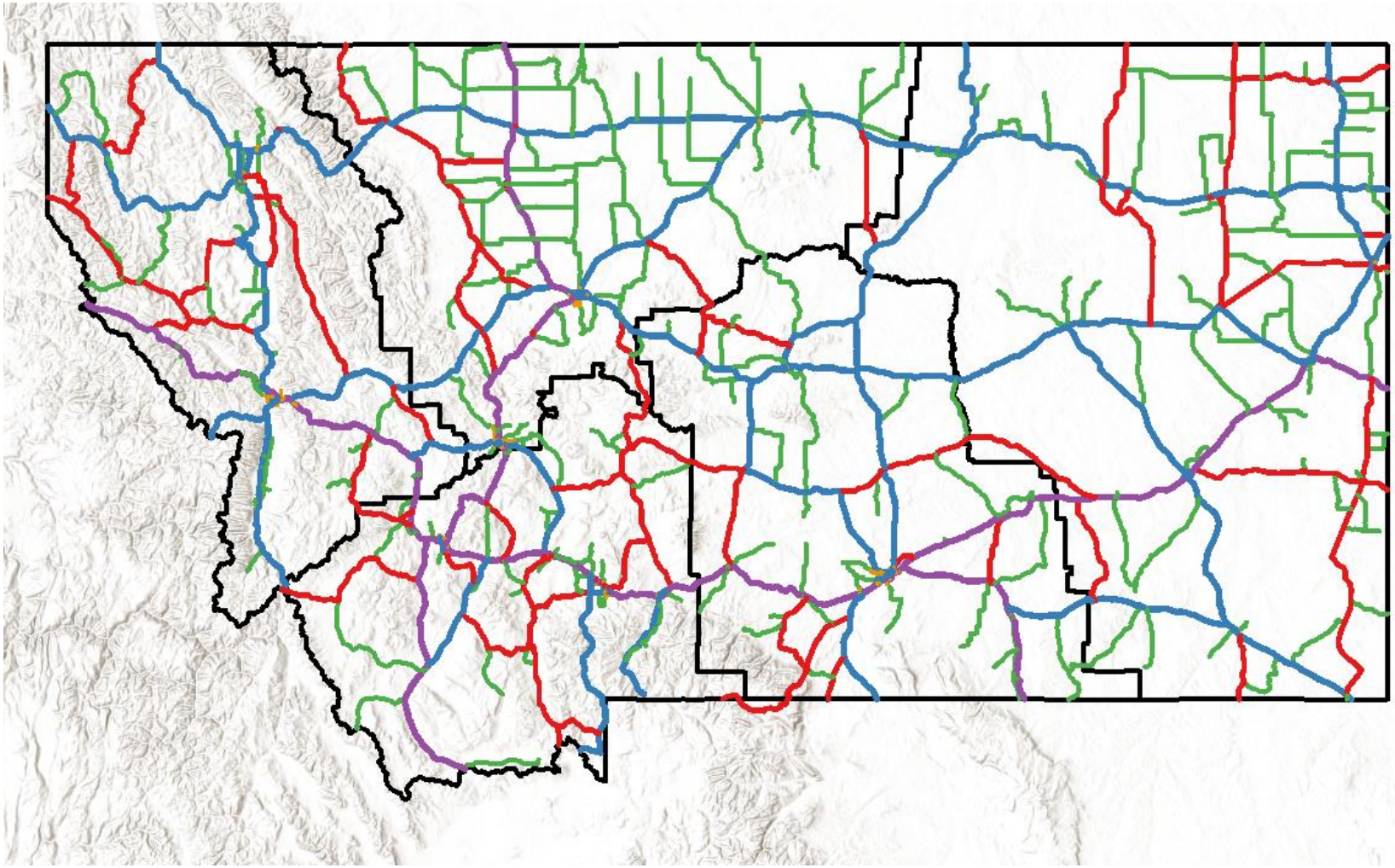
- Types of projects ranged from signing, slope flattening, turn lanes, shoulder widening, pedestrian crossing improvements, a signal, a roundabout and systemic type projects (rumble strips, signing, etc)

- Average Project Cost $400,000 per site.
- Over $30 M of safety improvements identified.

Statewide Safety Related Projects



Challenges of Montana's Roadway System



Challenge of Montana's Roadway System:

- Road Facts
- Crash Facts
  - Impact of # of Crashes
  - Roadway Ownership
  - Functional Class
- HSIP Program Limitations

Roadway Facts:

Approximately 75,000 miles of roads open to public travel in Montana (centerline miles):

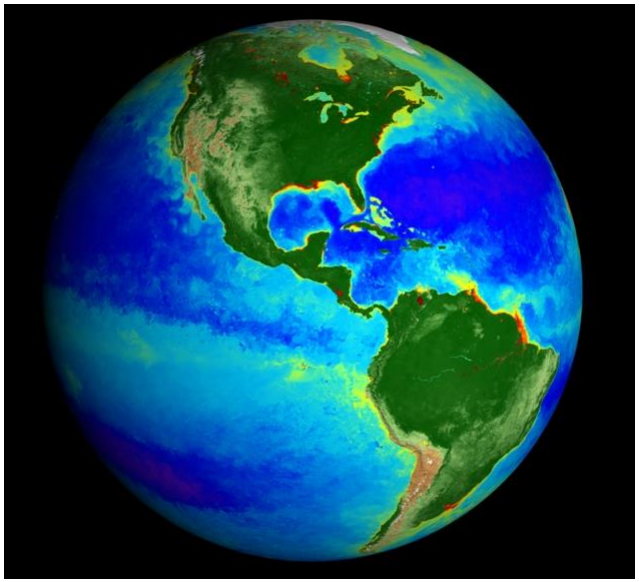
- Over 12,000 miles maintained by State of Montana
- Over 3000 miles of urban routes (approximately 300 miles maintained by MDT)
- Approximately 5,600 miles of total roadway on the Tribal Reservations (Approximately 1,100 miles maintained by MDT)

Roadway Facts:

Approximately 75,000 miles of roads open to public travel in Montana (centerline miles)

- The Earth is approximately

24,900 miles around



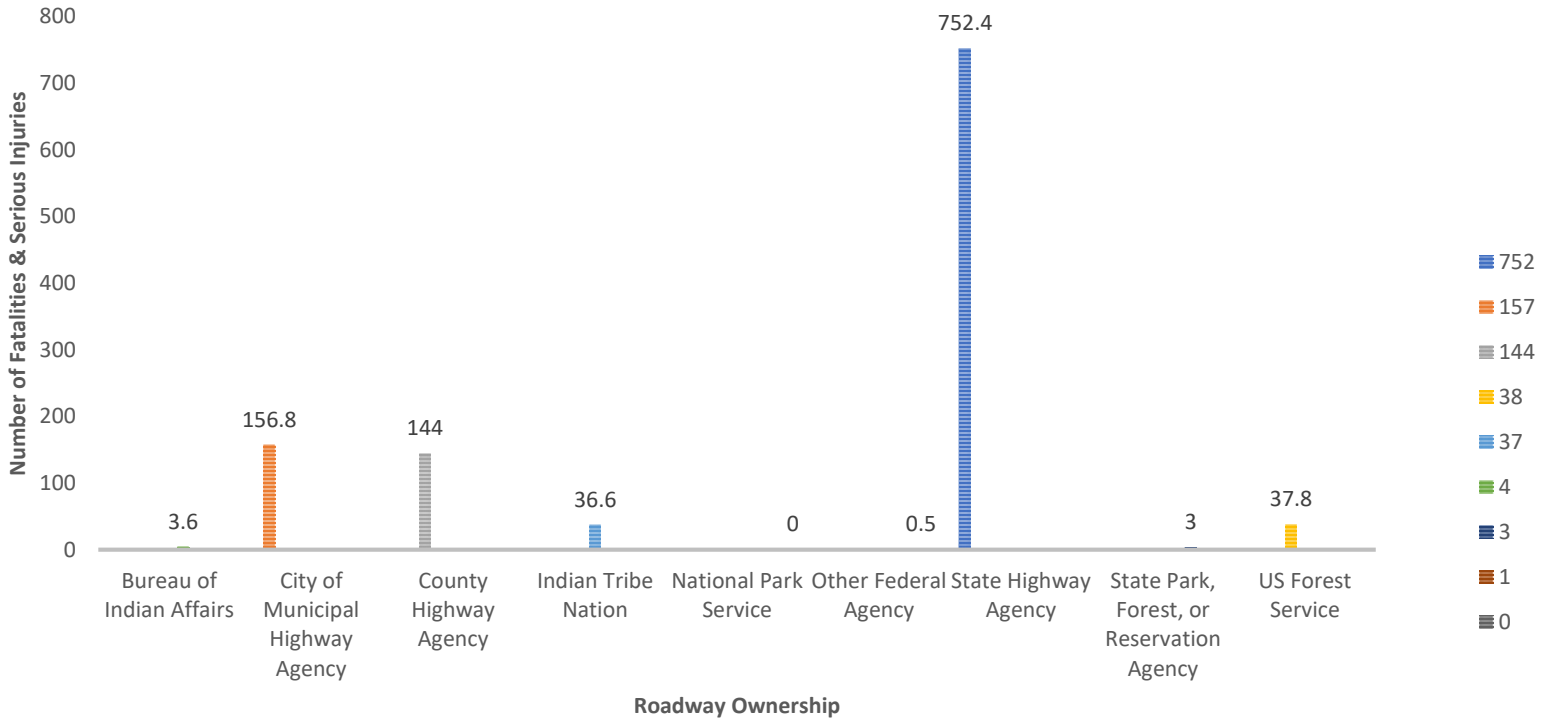
Crash Facts (2013-2017):

- Over 110,000 crashes statewide in a 5-year period.
- Over 5,600 fatalities and serious injuries.
  - 1,021 Fatalities

➢ 2010 Census Population Figures:

- Lewistown – 5,900 people
- Choteau County – 5,800 people
- Toole County – 5,000 people

Crash Facts – Roadway Ownership
(2017 Crash Data)



Crash Facts – Roadway Ownership
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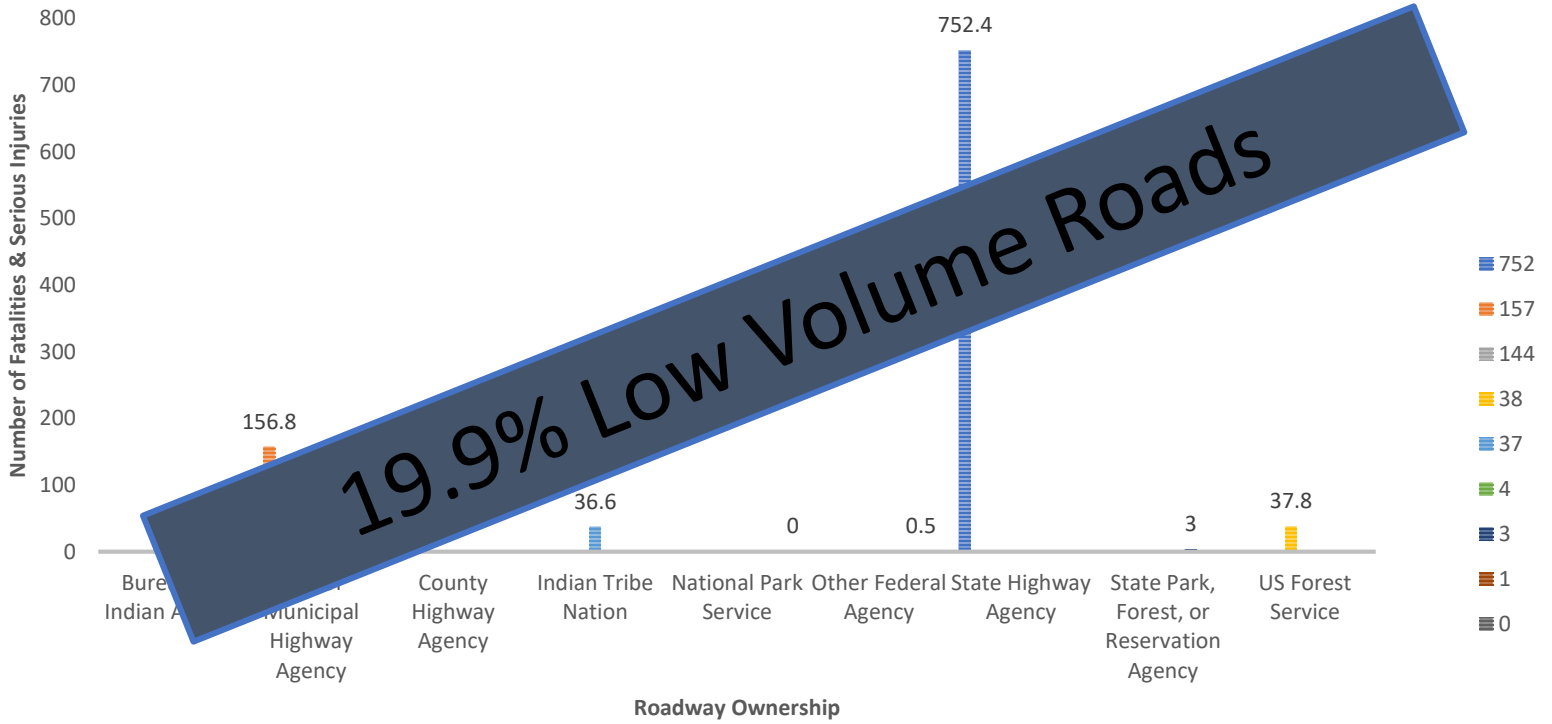

Crash Facts – Functional Class
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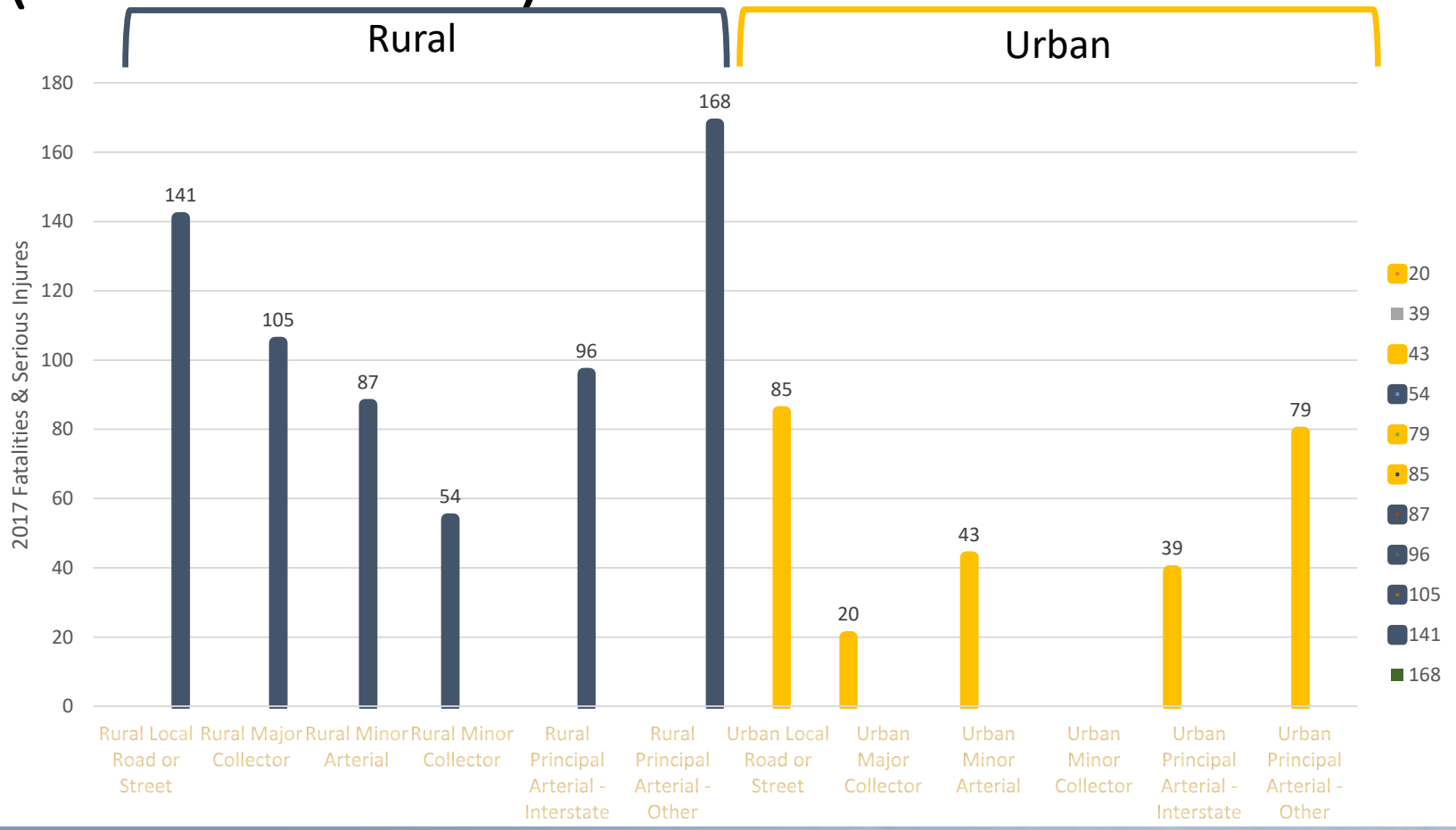

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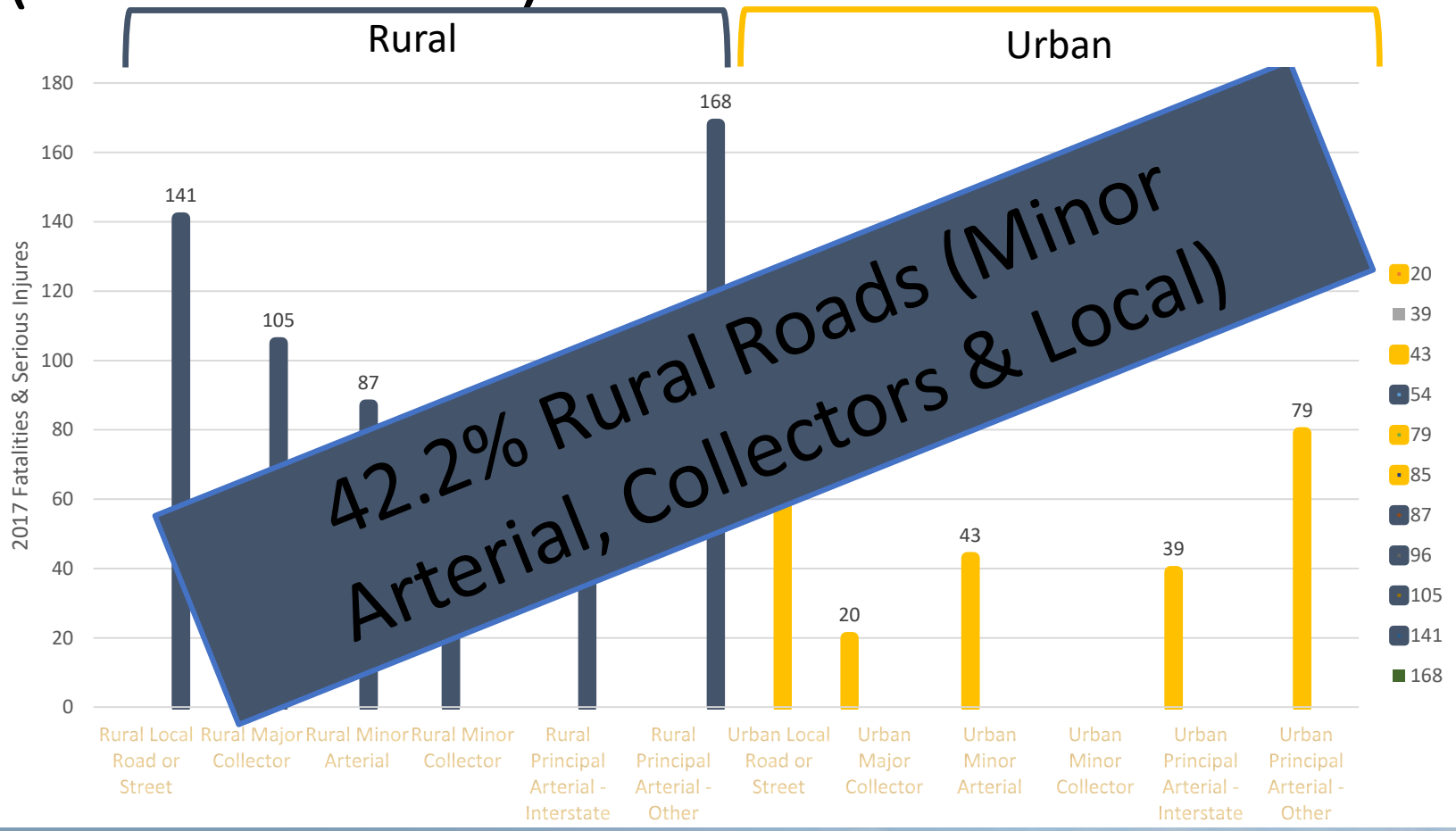


42.2% Rural Roads (Minor Arterial, Collectors & Local)

Highway Safety Improvement Program (HSIP):

- Historically – Data Driven = Crash Data Driven

- Challenges of Identifying Improvements for Low Volume Roads
  - Low traffic volumes
  - Minimal or non-existent crash data
  - Crash patterns aren't easily identifiable

- Traditional Options for Low Volume Road
  - Data Driven - Systemic Improvements – signing, delineation, etc

Highway Safety Improvement Program (HSIP):

Exploring New Options for Low Volume Road

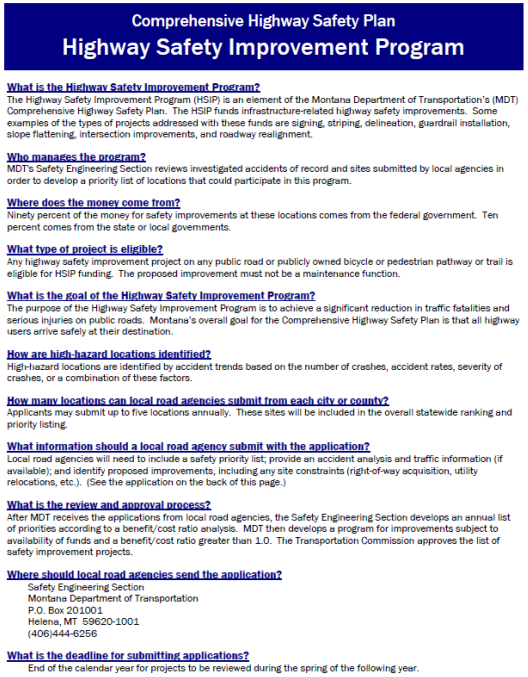
- Data Driven Options
  - Risk Analysis Type Tools
  - MSU – Western Transportation Institute
    - Research Project – Fall 2020
      - Methodology to Identify Locations on Low Volume Roads for safety improvements
    - Long Range Goal
      - Tools to develop Local Safety Plans
      - **GOAL – Use data driven tools to support the use of HSIP Funds on Low Volume Roads.**

HSIP Application

- Other government agencies can submit up to 5 locations annually for consideration.

- Use the HSIP Application on MDT's website:

http://www.mdt.mt.gov/publications/docs/forms/hsip_application.pdf



Comprehensive Highway Safety Plan
Highway Safety Improvement Program

What is the Highway Safety Improvement Program?
The Highway Safety Improvement Program (HSIP) is an element of the Montana Department of Transportation's (MDT) Comprehensive Highway Safety Plan. The HSIP funds infrastructure-related highway safety improvements. Some examples of the types of projects addressed with these funds are signing, striping, delineation, guardrail installation, slope flattening, intersection improvements, and roadway realignment.

Who manages the program?
MDT's Safety Engineering Section reviews investigated accidents of record and sites submitted by local agencies in order to develop a priority list of locations that could participate in this program.

Where does the money come from?
Ninety percent of the money for safety improvements at these locations comes from the federal government. Ten percent comes from the state or local governments.

What type of project is eligible?
Any highway safety improvement project on any public road or publicly owned bicycle or pedestrian pathway or trail is eligible for HSIP funding. The proposed improvement must not be a maintenance function.

What is the goal of the Highway Safety Improvement Program?
The purpose of the Highway Safety Improvement Program is to achieve a significant reduction in traffic fatalities and serious injuries on public roads. Montana's overall goal for the Comprehensive Highway Safety Plan is that all highway users arrive safely at their destination.

How are high-hazard locations identified?
High-hazard locations are identified by accident trends based on the number of crashes, accident rates, severity of crashes, or a combination of these factors.

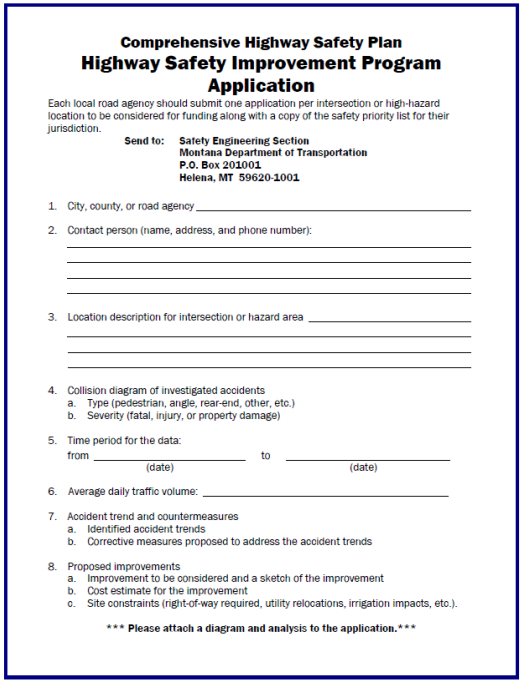
How many locations can local road agencies submit from each city or county?
Applicants may submit up to five locations annually. These sites will be included in the overall statewide ranking and priority listing.

What information should a local road agency submit with the application?
Local road agencies will need to include a safety priority list; provide an accident analysis and traffic information (if available); and identify proposed improvements, including any site constraints (right-of-way acquisition, utility relocations, etc.). (See the application on the back of this page.)

What is the review and approval process?
After MDT receives the applications from local road agencies, the Safety Engineering Section develops an annual list of priorities according to a benefit/cost ratio analysis. MDT then develops a program for improvements subject to availability of funds and a benefit/cost ratio greater than 1.0. The Transportation Commission approves the list of safety improvement projects.

Where should local road agencies send the application?
Safety Engineering Section
Montana Department of Transportation
P.O. Box 201001
Helena, MT 59620-1001
(406)444-6256

What is the deadline for submitting applications?
End of the calendar year for projects to be reviewed during the spring of the following year.



Comprehensive Highway Safety Plan
Highway Safety Improvement Program
Application

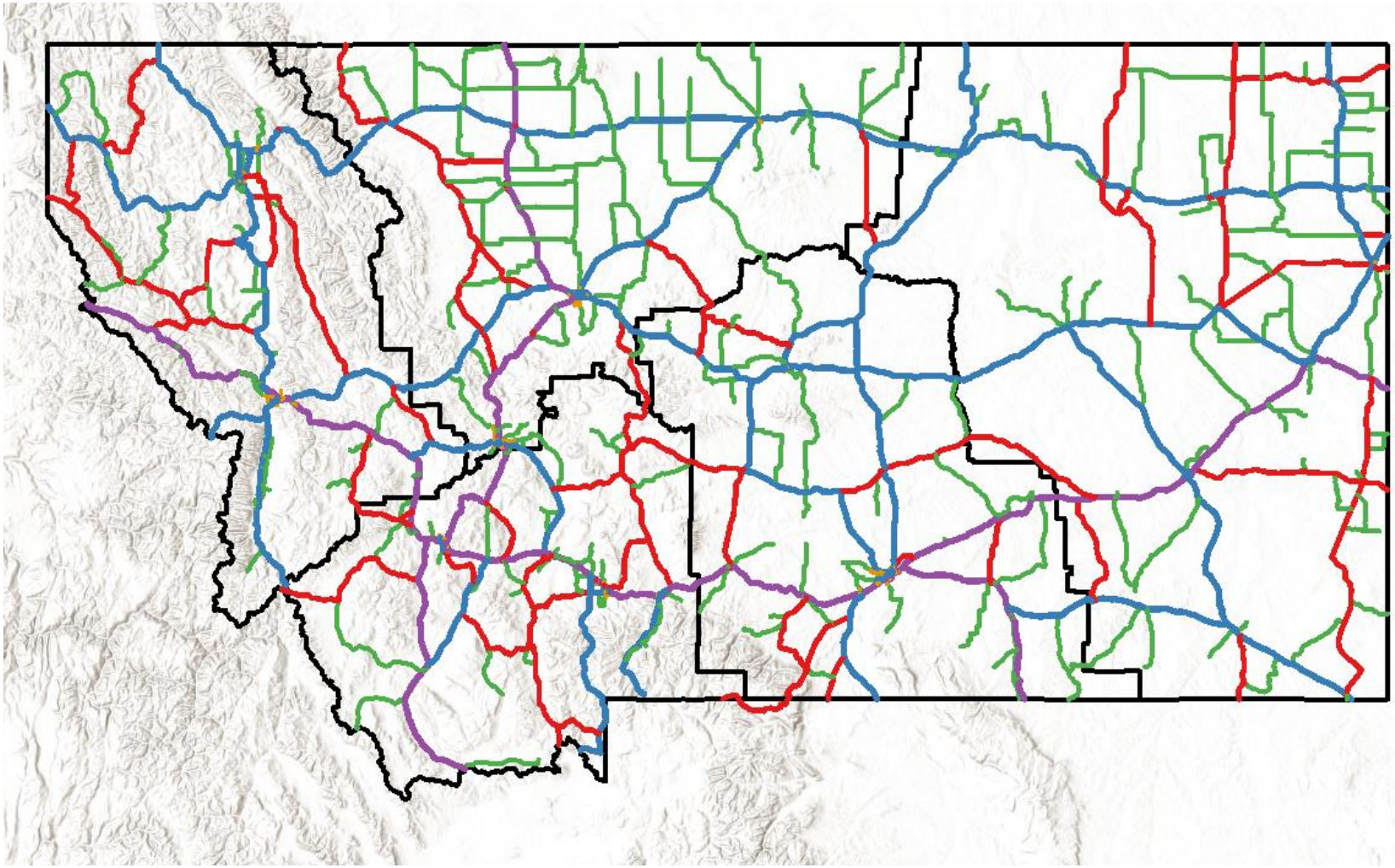
Each local road agency should submit one application per intersection or high-hazard location to be considered for funding along with a copy of the safety priority list for their jurisdiction.

Send to: **Safety Engineering Section**
Montana Department of Transportation
P.O. Box 201001
Helena, MT 59620-1001

1. City, county, or road agency _____
2. Contact person (name, address, and phone number):
   _____
   _____
   _____
   _____
3. Location description for intersection or hazard area _____
   _____
   _____
   _____
4. Collision diagram of investigated accidents
   a. Type (pedestrian, angle, rear-end, other, etc.)
   b. Severity (fatal, injury, or property damage)
5. Time period for the data:
   from _____ (date) to _____ (date)
6. Average daily traffic volume: _____
7. Accident trend and countermeasures
   a. Identified accident trends
   b. Corrective measures proposed to address the accident trends
8. Proposed improvements
   a. Improvement to be considered and a sketch of the improvement
   b. Cost estimate for the improvement
   c. Site constraints (right-of-way required, utility relocations, irrigation impacts, etc.).

***** Please attach a diagram and analysis to the application.*****

Tools for Improving Safety on Montana's Roadway System



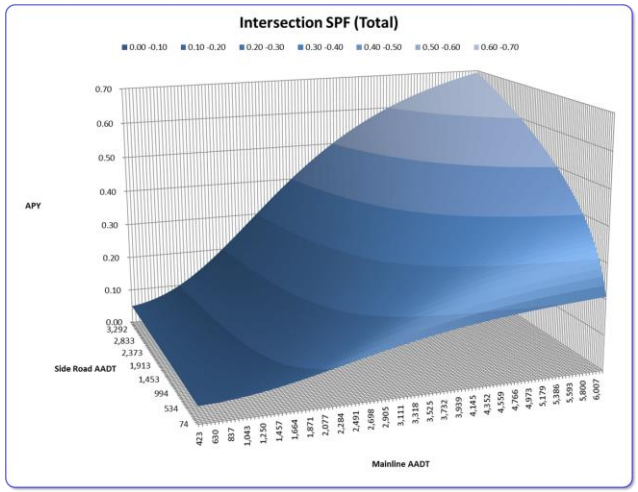
Intersection Safety Study

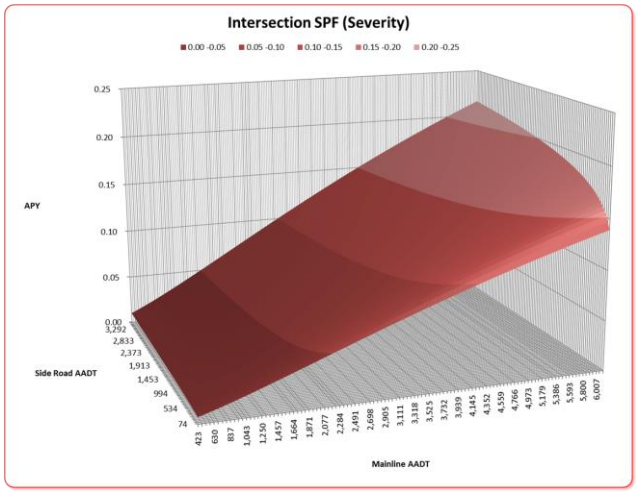
- Considers the magnitude of the safety issue
  - Same Level of Service of Safety (LOSS) concept
  - Montana specific SPF Models for various intersections
- Analyses the nature of the safety issue
  - Utilizes the diagnostic norms
  - One major difference is the side street volumes need to be factored into the equations

Intersection Safety Study

The Safety Performance Function of an Intersection can be viewed Mathematically as a 3-Dimensional Response Surface, where:

$$\#\ Crashes/Year = f(\ ADT_{Mainline}, ADT_{Side\ Road}\ )$$



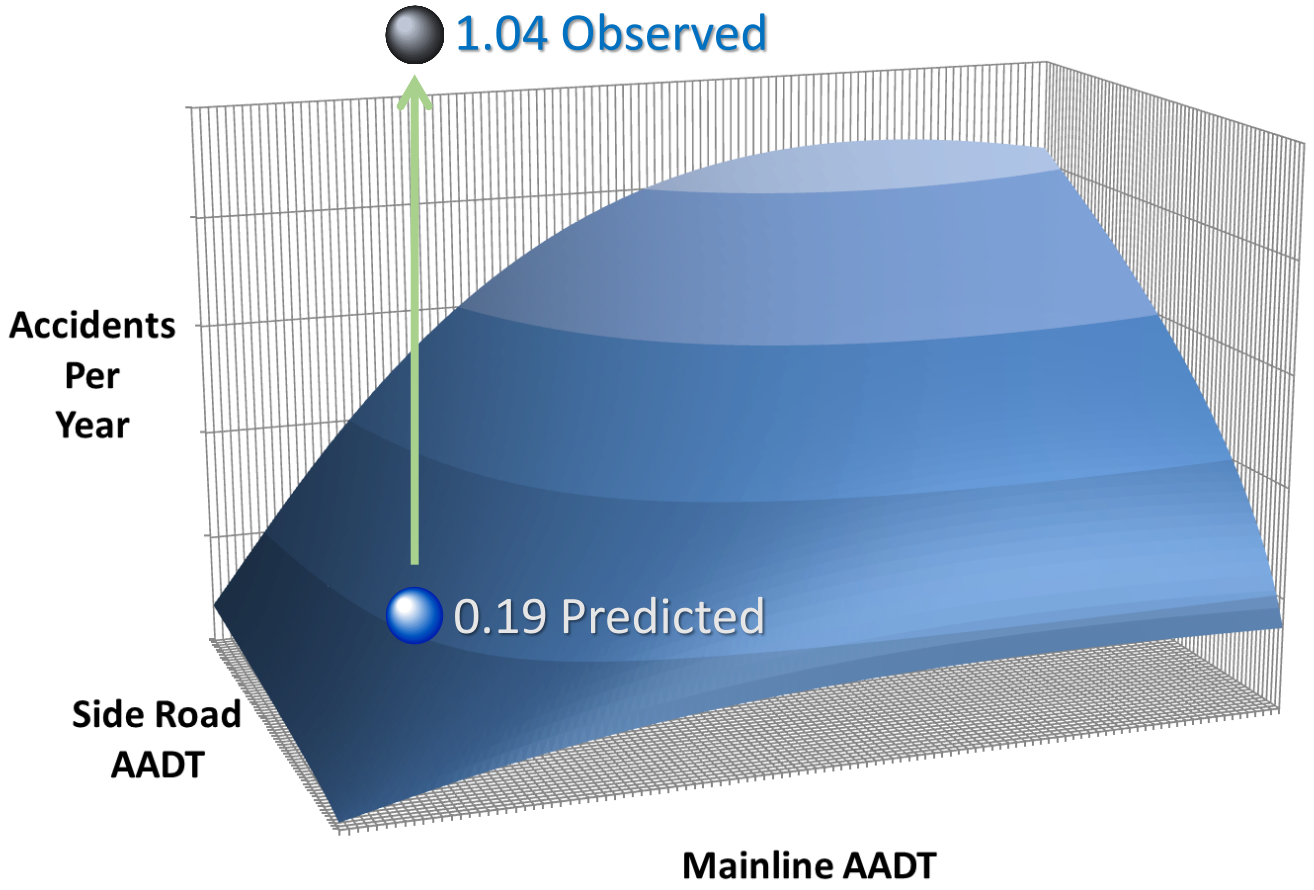


Real World Examples

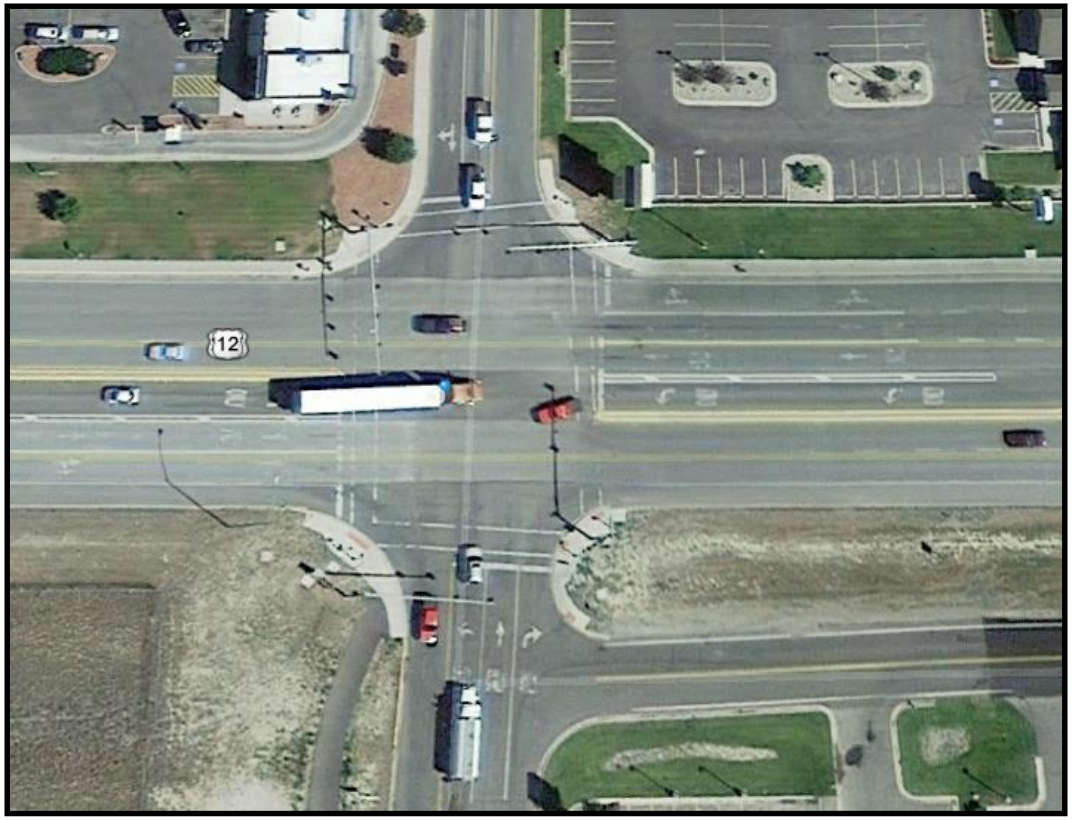
- Considers the magnitude of the safety issue
  - Same Level of Service of Safety (LOSS) concept
  - Montana specific SPF Models for various intersections

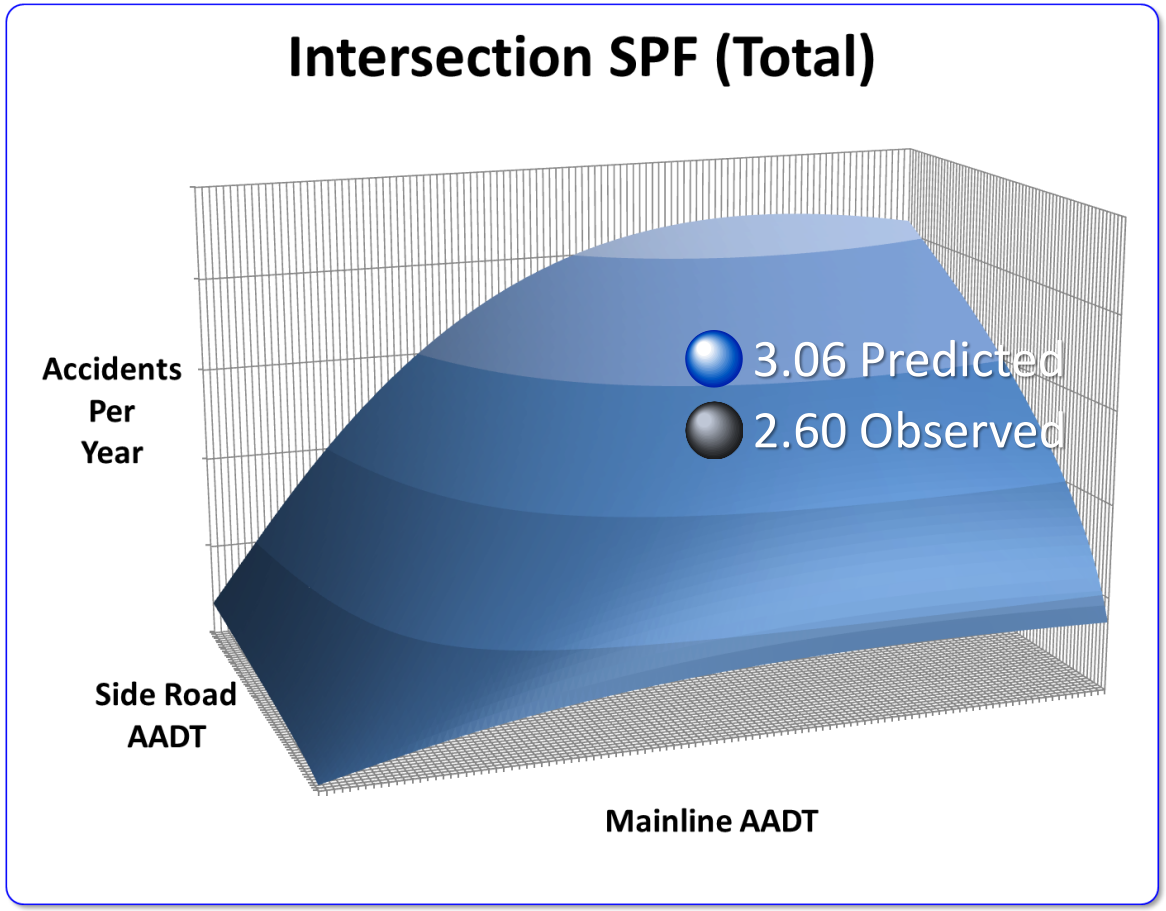
Example #1 – Rural Intersection

Intersection SPF (Total)



Example #2
Urban Signalized Intersection




Intersection SPF (Total)
Accidents Per Year
3.06 Predicted
2.60 Observed
Side Road AADT
Mainline AADT

Real World Examples

- Analyses the nature of the safety issue
  - Utilizes the diagnostic norms
  - One major difference is the side street volumes need to be factored into the equations

Diagnostic Norms – U4XDU4

Montana Department of Transportation
DiExSys™ Roadway Safety Systems
Diagnostics Comparison Percentages Baselines

11/03/2016

Job #: 20161103160729

Highway Class: MT - Urban 4-Lane Divided UnSignalized 4-Leg Intersections - AADT All Totals (2016)

Baseline Statistics	Statewide Average	
CATEGORY	# ACC's	%
Property Damage Only (PDO)	681	70.21%
Injury (INJ)	286	29.48%
Fatal (FAT)	3	0.31%
Persons Injured	427	
Persons Killed	3	
Single Vehicle Accidents	27	2.78%
Two Vehicle Accidents	862	88.87%
Three or More Vehicle Accidents	81	8.35%
Unknown Number of Vehicles	0	0.00%
On Road	960	98.97%
Off Road	9	0.93%
Off Road Left	1	0.10%
Off Road Right	8	0.82%
Off Road at Tee	0	0.00%
Off Road in Median	0	0.00%
Unknown Road Location	1	0.10%
Overturning	1	0.10%
Other Non Collision	0	0.00%
Vehicle Cargo or Debris	0	0.00%
Pedestrian	11	1.13%
Broadside	313	32.27%
Head On	7	0.72%
Rear End	380	39.18%
Sideswipe (Same Direction)	96	9.90%
Sideswipe (Opposite Direction)	8	0.82%
Approach Turn	75	7.73%

Baseline Statistics	Statewide Average	
CATEGORY	# ACC's	%
Large Boulders or Rocks	0	0.00%
Rocks in Roadway	0	0.00%
Barricade	0	0.00%
Wall or Building	0	0.00%
Crash Cushion	0	0.00%
Mailbox	0	0.00%
Other Fixed Object	6	0.62%
Involving Other Object	1	0.10%
Road Maintenance Equipment	0	0.00%
Unknown Accident Type	9	0.93%
Total Fixed Objects	24	2.47%
Total Other Objects	1	0.10%
Daylight	795	81.96%
Dawn or Dusk	22	2.27%
Dark - Lighted	123	12.68%
Dark - Unlighted	28	2.89%
Unknown Lighting	2	0.21%
No Adverse Weather	837	86.29%
Rain	55	5.67%
Snow or Sleet or Hail	69	7.11%
Fog	4	0.41%
Dust	1	0.10%
Wind	3	0.31%
Unknown Weather	1	0.10%
Dry Road	706	72.78%
Wet Road	122	12.58%

Potential Uses of Intersection Models

- Developing Initial HSIP List of Sites
- Tool to aid
  - Safety and Traffic Operations
  - Other MDT Bureaus and the Districts
    - Address Questions/Concerns
    - Prioritize Projects

Upcoming Systemic Projects

- High Tension Median Cable Rail
  - Design – MHP Involvement
- Centerline Rumble Strips
  - Missoula District
- Wrong Way – Phase II
  - ITS / Interactive Signage

Contact Information

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