Appendices

D. General [Appendices D. through J. are in a separate pdf file]
    1. An Introduction to the Highway Safety Manual
    2. SPF
    3. CMF
    4. CMF Clearing House Brochure
    5. NCHRP Crash Data Snapshot
E. Alaska
    1. Form 209, Operators report of accident
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    4. CARE Dashboard
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        a. Transportation Data & GIS Office Brochure
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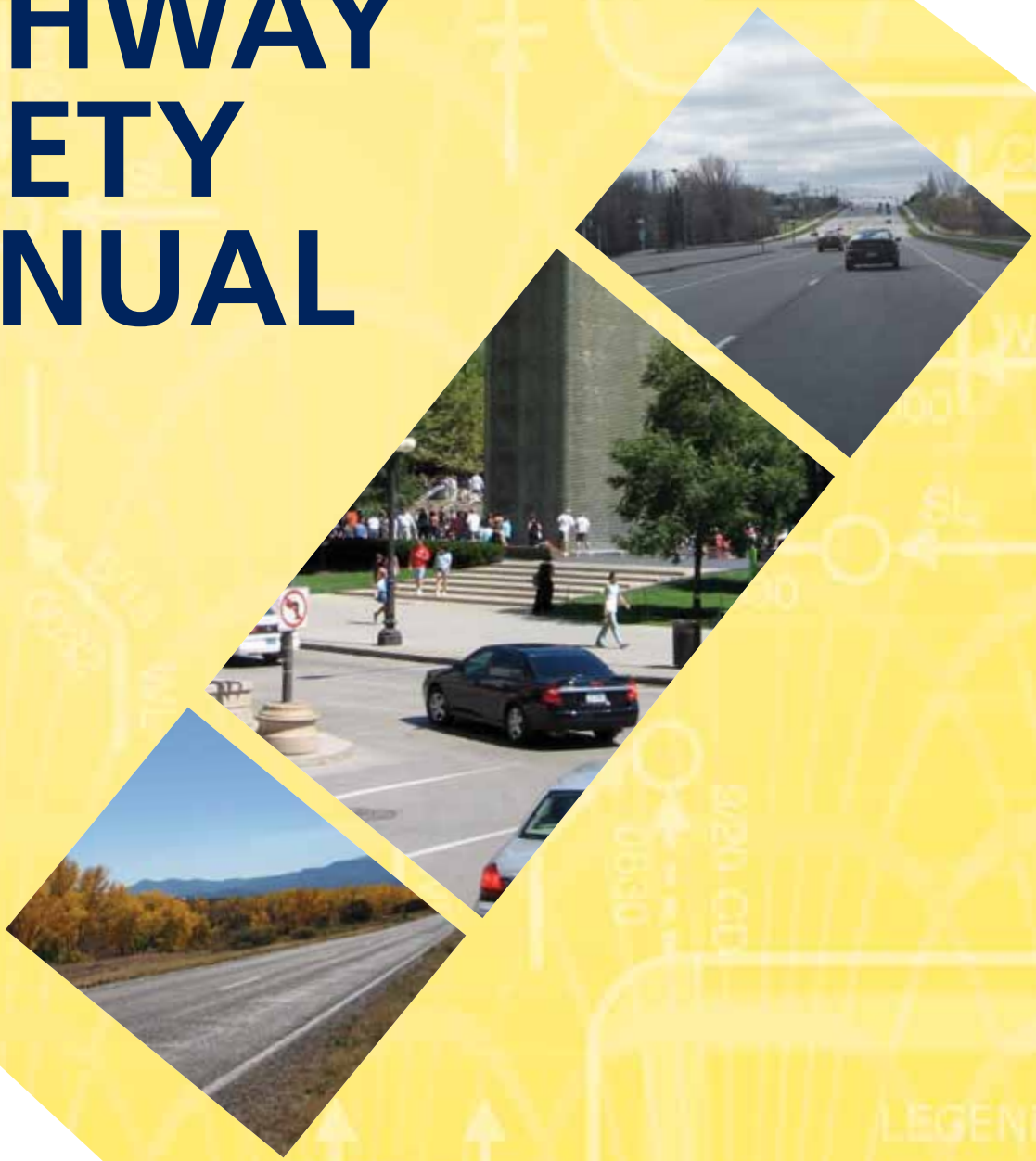
5. NCHRP Crash Data Snapshot

An Introduction to the

HIGHWAY SAFETY MANUAL



HSM
Highway Safety Manual
AASHTO

American Association of State Highway and Transportation Officials
AASHTO
The Voice of Transportation

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Section 1: HSM Overview

What is the Highway Safety Manual?

The Highway Safety Manual (HSM) introduces a science-based technical approach that takes the guesswork out of safety analysis. The HSM provides tools to conduct quantitative safety analyses, allowing for safety to be quantitatively evaluated alongside other transportation performance measures such as traffic operations, environmental impacts, and construction costs.

For example, the HSM provides a method to quantify changes in crash frequency as a function of cross-sectional features. With this method, the expected change in crash frequency of different design alternatives can be compared with the operational benefits or environmental impacts of these same alternatives. As another example, the costs of constructing a left-turn lane on a two-lane rural road can be compared to the safety benefits in terms of reducing a certain number of crashes.

The HSM provides the following tools:

- Methods for developing an effective roadway safety management program and evaluating its effects. A roadway safety management program is the overall process for identifying sites with potential for safety improvement, diagnosing conditions at the site, evaluating conditions and identifying potential treatments at the sites, prioritizing and programming treatments, and subsequently evaluating the effectiveness at reducing crashes of the programmed treatments. Many of the methods included in the HSM account for regression to the mean and can result in more effectively identifying improvements to achieve a quantifiable reduction in crash frequency or severity. Safety funds can then be used as efficiently as possible based on the identified locations.
- A predictive method to estimate crash frequency and severity. This method can be used to make informed decisions throughout the project development process, including: planning, design, operations, maintenance, and the roadway safety management process. Specific examples include screening potential locations for improvement and choosing alternative roadway designs.
- A catalog of crash modification factors (CMFs) for a variety of geometric and operational treatment types, backed by robust scientific evidence. The CMFs in the HSM have been developed using high-quality before/after studies that account for regression to the mean.

The HSM emphasizes the use of analytical methods to quantify the safety effects of decisions in planning, design, operations, and maintenance. The first edition does not address issues such as driver education, law enforcement, and vehicle safety, although these are important considerations within the broad topic of improving highway safety.

The HSM is written for practitioners at the state, county, metropolitan planning organization (MPO), or local level.

Regression to the mean is the natural variation in crash data. If regression to the mean is not accounted for, a site might be selected for study when the crashes are at a randomly high fluctuation, or overlooked from study when the site is at a randomly low fluctuation.

A Crash Modification Factor (CMF) is a factor estimating the potential changes in crash frequency or crash severity due to installing a particular treatment. The CMFs in the HSM have been developed based on a rigorous and reliable scientific process.

As an example, a 0.70 CMF corresponds to a 30 percent reduction in crashes. A 1.2 CMF corresponds to a 20 percent increase in crashes.

How is the HSM Applied?

The HSM provides an opportunity to consider safety quantitatively along with other typical transportation performance measures. The HSM outlines and provides examples of the following applications:

- Identifying sites with the most potential for crash frequency or severity reduction;
- Identifying factors contributing to crashes and associated potential countermeasures to address these issues;
- Conducting economic appraisals of potential improvements and prioritizing projects;
- Evaluating the crash reduction benefits of implemented treatments; and
- Estimating potential effects on crash frequency and severity of planning, design, operations, and policy decisions.

The HSM can be used for projects that are focused specifically on responding to safety-related questions. In addition, the HSM can be used to conduct quantitative safety analyses on projects that have not traditionally included this type of analysis, such as corridor studies to identify capacity improvements and intersection studies to identify alternative forms of traffic control. The HSM can also be used to add quantitative safety analyses to multidisciplinary transportation projects.

What is the Value of Using the HSM?

The HSM provides methods to integrate quantitative estimates of crash frequency and severity into planning, project alternatives analysis, and program development and evaluation, allowing safety to become a meaningful project performance measure. As the old adage says, "what gets measured gets done." By applying the HSM tools, improvements in safety will "get done."

Further, from a legislative perspective, the HSM will support states' progress toward federal, state, and local safety goals to reduce fatalities and serious injuries. As public agencies work toward their safety goals, the quantitative methods in the HSM can be used to evaluate which programs and project improvements are achieving desired results; as a result, agencies can reallocate funds toward those that are having the greatest benefit.

The HSM methods can be applied to all transportation projects—not just those specifically focused on responding to safety needs.

Section 2: HSM Contents

The HSM is organized into four parts:

PART A Introduction, Human Factors, and Fundamentals

Part A describes the purpose and scope of the HSM, explaining the relationship of the HSM to planning, design, operations, and maintenance activities. Part A also includes fundamentals of the processes and tools described in the HSM. Chapter 3 (Fundamentals) provides background information needed to apply the predictive method, crash modification factors, and evaluation methods provided in Parts B, C, and D of the HSM.
The chapters in Part A are:

- Chapter 1 – Introduction and Overview
- Chapter 2 – Human Factors
- Chapter 3 – Fundamentals

PART B Roadway Safety Management Process

Part B presents suggested steps to monitor and reduce crash frequency and severity on existing roadway networks. It includes methods useful for identifying improvement sites, diagnosis, countermeasure selection, economic appraisal, project prioritization, and effectiveness evaluation. As shown in Figure 1, the chapters in Part B are:

- Chapter 4 – Network Screening
- Chapter 5 – Diagnosis
- Chapter 6 – Select Countermeasures
- Chapter 7 – Economic Appraisal
- Chapter 8 – Prioritize Projects
- Chapter 9 – Safety Effectiveness Evaluation

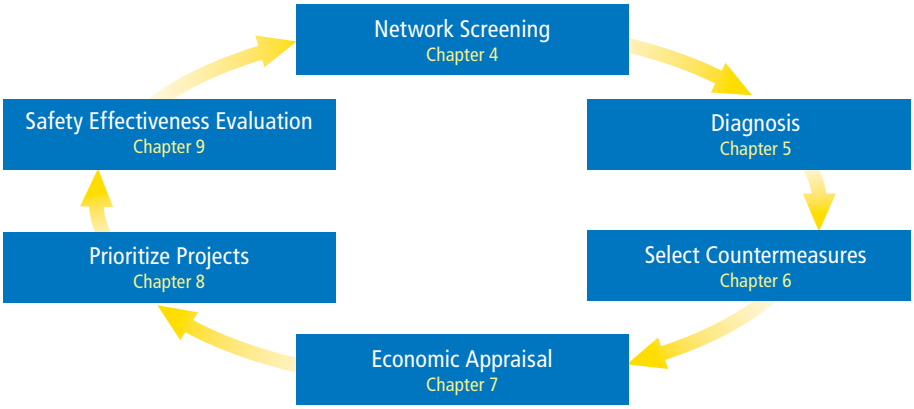


Figure 1 Chapters in Part B

Highlights of this part of the manual are advances in network screening methods and safety evaluation methods. In Chapter 4 (Network Screening), several new network screening performance measures are introduced to shift the safety analysis focus away from traditional crash rates. The major limitation associated with crash rate analysis is the incorrect assumption that a linear relationship exists between traffic volume and the frequency of crashes. As an alternative analysis tool, a focus on expected crash frequency can account for regression to the mean when developing performance measures for network screening. This analysis will provide a more stable list of locations that might respond to safety improvements than lists prepared with traditional methods. This, in turn, will result in a more effective spending of improvement funds.

Chapter 9 (Safety Effectiveness Evaluation) provides methods for evaluating the effectiveness of an individual treatment, a series of treatments, or an overall program, and for calculating a crash modification factor (CMF). Evaluating safety investments is often an overlooked element of the roadway safety management process. The HSM brings a focus back to this step in the process.

PART C Predictive Method

Part C provides a predictive method for estimating expected average crash frequency of a network, facility, or individual site, and it introduces the concept of safety performance functions (SPFs). As shown in Table 1, the chapters in Part C provide the predictive method for segments and intersections for the following facility types:

Safety Performance Functions (SPFs) are equations that estimate expected average crash frequency as a function of traffic volume and roadway characteristics (e.g., number of lanes, median type, intersection control, number of approach legs). Their use enables the correction of short-term crash counts.

- Chapter 10 – Rural Two-Lane, Two-Way Roads
- Chapter 11 – Rural Multilane Highways
- Chapter 12 – Urban and Suburban Arterials

Predicting expected average crash frequency as a function of traffic volume and roadway characteristics is a new approach that can be readily applied in a variety of ways, including design projects, corridor planning studies, and smaller intersections studies. The approach is applicable for both safety specific studies and as an element of a more traditional transportation study or environmental analysis.

Table 1 Facility Types with Safety Performance Functions

HSM Chapter	Undivided Roadway Segments	Divided Roadway Segments	Intersections			
			Stop Control on Minor Leg(s)		Signalized	
			3-Leg	4-Leg	3-Leg	4-Leg
10 Rural Two-Lane, Two-Way Roads	✔		✔	✔		✔
11 Rural Multilane Highways	✔	✔	✔	✔		✔
12 Urban and Suburban Arterials	✔	✔	✔	✔	✔	✔

PART D Crash Modification Factors

For each facility type, prediction models for set base conditions are found. CMFs quantify the change in expected average crash frequency as a result of geometric or operational modifications to a site that differs from set base conditions. As shown in Table 2, Part D provides a catalog of treatments organized by site type:

- Chapter 13 – Roadway Segments
- Chapter 14 – Intersections
- Chapter 15 – Interchanges
- Chapter 16 – Special Facilities
- Chapter 17 – Road Networks

The CMFs will be readily applicable to any design or evaluation process where optional treatments are being considered. The CMFs will also be a valuable addition to the documentation of design exceptions. Table 2 provides an example of a CMF.

Table 2 Sample Crash Modification Factors

Potential Crash Effects of Providing a Median on Multilane Roads

Treatment	Setting (Road Type)	Traffic Volume	Accident Type (Severity)	CMF	Std. Error
Provide a median	Urban (Arterial Multilane)	Unspecified	All types (Injury)	0.78	0.02
			All types (Non-injury)	1.09	0.02
	Rural (Multilane)		All types (Injury)	0.88	0.03
			All types (Non-injury)	0.82	0.03

Base Condition: Absence of raised median

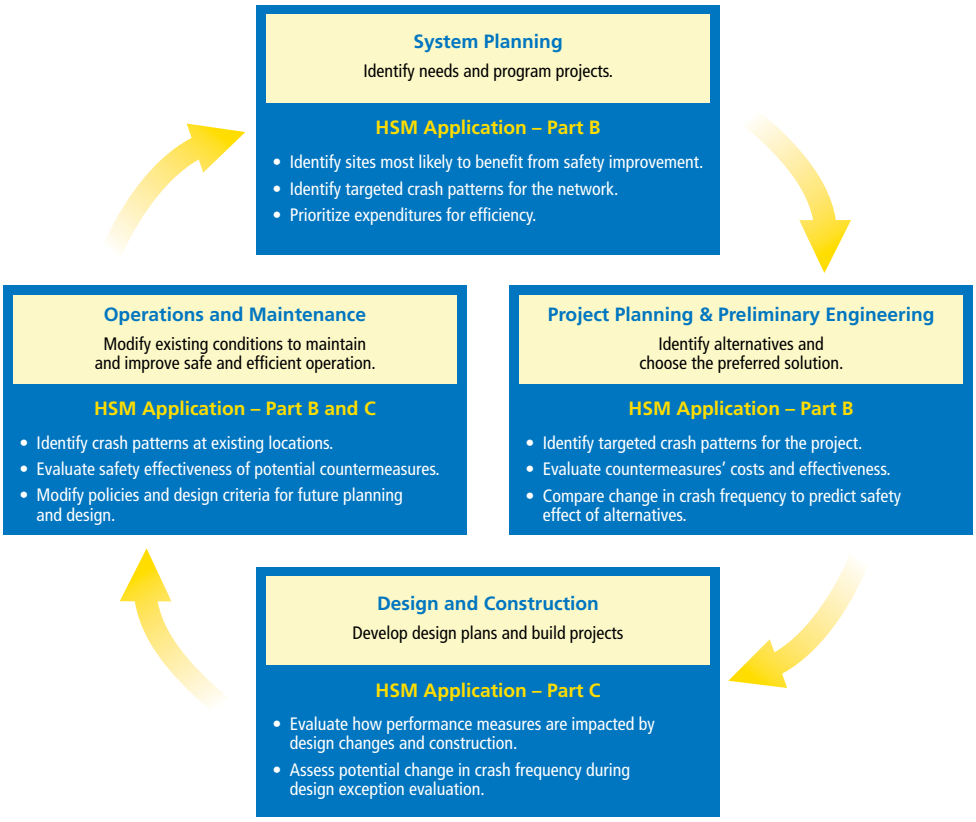
The HSM provides a catalog of Crash Modification Factors for a variety of facility types.

The HSM methods can be applied in each step of the project development process.

Section 3: Integrating the HSM with the Project Development Process

The project development process outlines the typical stages of a project from planning to post-construction operations and maintenance activities. The HSM can be applied in each step of the process. Figure 2 shows the relationship between a generalized project development process and the HSM.

Figure 2 Applications of the HSM in the Project Development Process



Section 4: Data Needs

In general, there are three categories of data needed to apply the HSM: crash data, traffic volume data, and roadway characteristics data. The crash data needs are limited to crash data by date (year), location, type, severity level, relationship to intersection (at-intersection, intersection related, not intersection related), and distance from the intersection. The traffic volume data requirement for roadway segments is the annual average daily traffic (AADT). For intersections, the traffic volume requirement is the major and minor street entering AADT.

The roadway characteristics data requirements change as a function of the facility type (e.g., two-lane, two-way rural road, multilane rural highway, urban/suburban arterial) and whether an intersection or segment is under consideration. Table 3 provides a summary of the roadway characteristics data requirements.

Table 3 Site Characteristics and Traffic-Volume Variables Used in HSM Safety Predictions

Variables	Chapter 10 Rural Two-Lane, Two-Way Roads	Chapter 11 Rural Multilane Highways	Chapter 12 Urban and Suburban Arterials
Roadway Segments			
Area type (rural/suburban/urban)	✓	✓	✓
Annual average daily traffic volume	✓	✓	✓
Length of roadway segment	✓	✓	✓
Number of through lanes	✓	✓	✓
Lane width	✓	✓	
Shoulder width	✓	✓	
Shoulder type	✓	✓	
Presence of median (divided/undivided)		✓	✓
Median width		✓	
Presence of concrete median barrier		✓	
Presence of passing lane	✓		
Presence of short four-lane section	✓		
Presence of two-way left-turn lane	✓		✓
Driveway density	✓		
Number of major commercial driveways			✓
Number of minor commercial driveways			✓
Number of major residential driveways			✓
Number of minor residential driveways			✓
Number of major industrial/institutional driveways			✓
Number of minor industrial/institutional driveways			✓
Number of other driveways	✓		
Horizontal curve length	✓		
Horizontal curve radius	✓		
Horizontal curve superelevation	✓		
Presence of spiral transition	✓		
Grade	✓		
Roadside hazard rating	✓		
Roadside slope		✓	
Roadside fixed-object density			✓
Roadside fixed-object offset			✓
Percent of length with on-street parking			✓
Type of on-street parking			✓
Presence of lighting			✓
Intersections			
Area type (rural/suburban/urban)	✓	✓	✓
Major-road average daily traffic volume	✓	✓	✓
Minor-road average daily traffic volume	✓	✓	✓
Number of intersection legs	✓	✓	✓
Type of intersection traffic control	✓	✓	✓
Left-turn signal phasing (if signalized)			✓
Presence of right turn on red (if signalized)			✓
Presence of red-light cameras			✓
Presence of median on major road		✓	
Presence of major-road left-turn lane(s)	✓	✓	✓
Presence of major-road right-turn lane(s)	✓	✓	✓
Presence of minor-road left-turn lane(s)		✓	
Presence of minor-road right-turn lane(s)		✓	
Intersection skew angle	✓	✓	
Intersection sight distance	✓	✓	
Terrain (flat vs. level or rolling)		✓	
Presence of lighting		✓	✓

NCHRP Research Results Digest 329: HSM Data Needs Guide, 2008. Data requirements are for Part C only.

Data needs for applying the HSM methods change by the type of facility.

Section 5: Example Applications

PART B Network Screening Example (Chapter 4)

Chapter 4 of the *Highway Safety Manual* presents 13 optional performance measures for network screening. This sample application illustrates a network screening process for prioritizing spending at six intersections within a community using the Excess Expected Average Crash Frequency with Empirical Bayes (EB) Adjustment method. Network screening is the process of evaluating a network of facilities for sites likely to respond to safety improvements. The Excess Expected Average Crash Frequency with Empirical Bayes (EB) Adjustment performance measure combines predictive model crash estimates with historical crash data to obtain a more reliable estimate of crash frequency. This method also accounts for bias due to regression to the mean.

Data Requirements

The data required for the application of this method are:

- Historical crash data by severity and location
- Traffic volume (AADT for segments; AADT for major and minor roads for intersections)
- Basic site characteristics (e.g., roadway cross-section, intersection control)
- Calibrated Safety Performance Functions (SPFs) and over-dispersion parameters

Sample Application

The basis for the Excess Expected Average Crash Frequency with EB Adjustment performance measure is that each site is evaluated as a function of how much the predicted average crash frequency for the site differs from the long-term EB adjusted expected average crash frequency for the same site. This difference is referred to as the "Excess" value (see Table 4). Sites with a high "Excess" value are most likely to respond to safety improvements because they are theoretically experiencing more crashes than other similar sites. An advantage of this method is that it may be used as a performance measure to evaluate a mix of facility types and traffic volumes in a single ranking. The basic procedure is as follows:

1 For each site, calculate the Predicted Average Crash Frequency using the methods and predictive formulas presented in Part C of the HSM.

2 For each site, calculate the Expected Average Crash Frequency using the EB method presented in the Part C Appendix.

3 Estimate an "Excess" value using the following formula:

$$Excess_y = (N_{expected,\ n(PDO)} - N_{predicted,\ n(PDO)}) + (N_{expected,\ n(FI)} - N_{predicted,\ n(FI)})$$

$$Excess_{intersection\ 1} = (1.7 - 0.9) + (1.2 - 0.5) = 1.50$$

Where:
$Excess_y$ = Excess expected crashes for year
$N_{expected,\ n}$ = EB-adjusted expected average crash frequency for year
$N_{predicted,\ n}$ = SPF predicted average crash frequency for year

Network screening is the process of evaluating a network of facilities for sites likely to respond to safety improvements.

Table 4 Predicted Average Crash Frequency

Int.	Int. Type	Major Street Volume (AADT)	Minor Street Volume (AADT)	Observed Average Crash Frequency (FI)	Observed Average Crash Frequency (PDO)	SPF Predicted Average Crash Frequency (FI)[1]	SPF Predicted Average Crash Frequency (PDO) [1]	EB-Adjusted Expected Average Crash Frequency (FI)	EB-Adjusted Expected Average Crash Frequency (PDO)	Excess $(N_{EB} - N_{SPF})_{PDO} + (N_{EB} - N_{SPF})_{FI}$
1	3-Leg Signal (Urban Arterial)	8,885	6,313	2.8	3.4	0.5	0.9	1.2	1.7	1.50
2	4-Leg Signal (Urban Arterial)	18,447	2,569	2.8	5.0	1.3	2.6	1.7	3.6	1.49
3	4-Leg Signal (Urban Arterial)	16,484	2,041	1.4	2.0	1.1	2.2	1.2	2.1	0.03
4	4-Leg Signal (Urban Arterial)	23,793	7,700	4.4	4.0	2.2	4.4	2.9	4.2	0.61
5	4-Leg Signal (Urban Arterial)	19,726	10,084	1.4	8.8	1.8	3.9	1.7	6.1	2.05
6	3-Leg Signal (Urban Arterial)	25,559	1,440	2.6	6.6	1.0	1.8	1.5	3.5	2.22

[1] In this example, the local geometric conditions are the same as the geometric conditions for the SPF; therefore, all CMFs = 1.0.
AADT = Average Annual Daily Traffic
FI = Fatal-and-Injury Crashes
PDO = Property-Damage-Only Crashes

Results:

In this sample application, the final ranking of the intersections is determined based on the resulting "Excess" value (see Table 5). The intersection most likely to benefit from safety improvements in this example is Intersection 6, which has an "Excess" value of 2.22. Diagnosis and selection of treatment will be required to establish the potential for such improvement.

Table 5 Ranking of "Excess" Value

Intersection	Excess
6	2.22
5	2.05
1	1.50
2	1.49
4	0.61
3	0.03

This predictive method example demonstrates the quantitative safety analysis of design alternatives.

PART C Predictive Method Example

Background, Issues, and Objectives

The Main Street corridor is 1.5 miles long, connecting residential and industrial uses across a river to the downtown business district. It is an important vehicle and bicycle commuter route. The average daily traffic volume along this route ranges from 20,000 to 25,000 vehicles per day. The corridor has received funding for major geometric improvements. This study was conducted to evaluate the traffic operations and safety impacts of various design alternatives for the entire corridor. Several options were considered as part of the project, including converting the 2- or 3-lane roadway to a 5-lane road, or converting the roadway to a 3-lane road. Each case would include a mix of traffic signals and roundabouts at the intersections. This project example demonstrates the quantitative safety analysis of two alternatives on a small portion of the corridor.

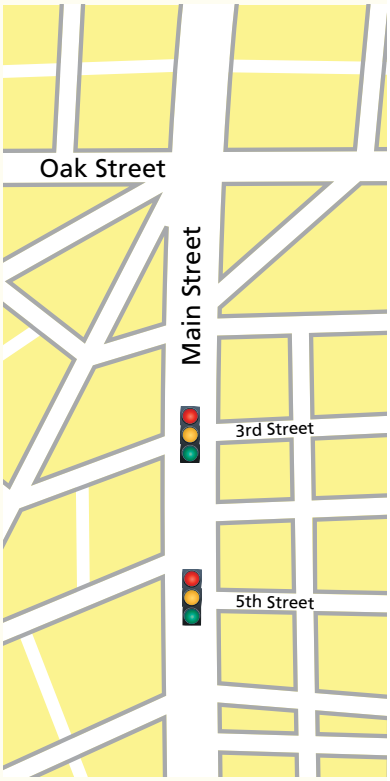
Data Requirements

Segments

- Segment Length (miles)
- Through Lanes (number)
- Median Type (divided/undivided)
- Median Width (feet)
- On-Street Parking (yes/no)
- Fixed Object Density (obj/mile)
- Average Offset of Fixed Objects (feet)
- Roadway Lighting (yes/no)
- Speed Limit (mph)
- Traffic Volume (veh/day)
- Number/Types of Driveways

Intersections

- Number of Intersection Legs
- Traffic Control (signal, stop, roundabout)
- Left-Turn Lanes and Phasing (protected, permitted, protected/permitted)
- Right-Turn Lanes and Control of Right Turn (permitted on red, prohibited on red)
- Lighting (yes/no)
- Maximum Number of Traffic Lanes Crossed by Pedestrians (number)
- Nearby Bus Stops, Schools, and Alcohol Sales Establishments (number)
- Entering Traffic Volumes (veh/day)
- Pedestrian Activity (yes/no)



Analysis Methodology Overview

The crash frequency for each segment and intersection is predicted using an iterative 18-step method in Chapter 12, "Urban and Suburban Arterials." In summary, this method consists of initially calculating multiple- and single-vehicle fatal-and-injury and property-damage-only crashes; these values are added to obtain base predicted vehicle crashes. The next step is to adjust the base predicted vehicle crashes with crash modification factors (CMFs) based on the roadway characteristics. Finally, this value is added to predicted bicycle and pedestrian crashes. If a calibration factor was available, or historical data was available to apply the Empirical Bayes method, these two steps would be included. A sample calculation using the base equation for predicted average crash frequency is shown below, Equation 1 illustrates the base equation. Sample calculations are shown for the Main Street/3rd Street intersection no-build conditions.

Equation 1

$$N_{bi} = N_{spf\ int} \times (CMF_{1i} \times CMF_{2i} \times ... \times CMF_{6i}) \times C$$

$$N_{bi} = 12.97 \times (.066 \times 0.96 \times 0.88 \times 1.00 \times 0.91 \times 1.00) \times 1.00 = 6.63 \text{ crashes/year}$$

Where:

N_{bi} = Predicted average crash frequency for an intersection

$N_{spf\ int}$ = Predicted average crash frequency for base conditions ($N_{spf\ int}$ = 12.97, see below)

$CMF_{1i} \ldots CMF_{6i}$ = Crash modification factors for left-turn lanes (CMF_{1i} = 0.66), left-turn phasing (CMF_{2i} = 0.96), right-turn lanes (CMF_{3i} = 0.88), right turn on red (CMF_{4i} = 1.00), lighting (CMF_{5i} = 0.91), and red-light camera (CMF_{6i} = 1.00).

C = Calibration factor (C = 1.00)

Note, as this is a multi-step process there are multiple equations that are used to calculate $N_{spf\ int}$, (e.g., by crash severity, by mode), these steps are not detailed in this example. An interim equation used in that process for the Main Street/3rd Street intersection no-build condition is illustrated as Equation 2.

Equation 2

$$N'_{bimv(FI)} = exp(a + b \times ln(AADT_{maj}) + c \times ln(AADT_{min}))$$

$$N'_{bimv(FI)} = exp(-13.14 + 1.18 \times ln(33{,}910) + 0.22 \times ln(25{,}790)) = 4.07 \text{ crashes/year}$$

Where:

$N'_{bimv(FI)}$ = Multiple vehicle intersection fatal/injury crashes

a, b, and c = Regression coefficients (–13.14, 1.18, and 0.22 for 4-leg signalized intersections)

$AADT_{maj}$ = Annual average daily traffic on major road (33,910)

$AADT_{min}$ = Annual average daily traffic on minor road (25,790)

Table 6 Forecast Crash Frequency

	2035 Forecast Crash Frequency (Crashes/Year)								
	No-Build			Alternative 1 (Mix 3- and 5-Lane)			Alternative 2 (5-Lane)		
Intersection/ Segment[1]	Facility	AADT[2]	Crashes/ Year	Facility	AADT[2]	Crashes/ Year	Facility	AADT[2]	Crashes/ Year
Int: Main & Oak	Stop	35,730/ 3,650	3.26	Roundabout	35,730/ 3,650	1.67	Signal	39,080/ 5,280	6.93
Seg: Oak to 3rd St.	3-Lane	34,580	8.30	3-Lane	34,580	5.74	5-Lane	38,150	9.32
Int: Main & 3rd	Signal	33,910/ 25,790	6.63	Roundabout	33,910/ 25,790	3.43	Roundabout	36,900/ 29,400	3.86
Seg: 3rd to 5th	5-Lane	33,270	5.05	5-Lane	33,270	1.51	5-Lane	37,310	1.74
Int: Main & 5th	Signal	33,200/ 5,940	6.40	Roundabout	33,200/ 5,940	3.32	Roundabout	37,860/ 7,230	3.99
Total Prediction	29.6 crashes/year			15.7 crashes/year			25.8 crashes/year		
Change Relative to No-Build				47% Decrease			13% Decrease[3]		

[1] For the purposes of presenting the results, crashes estimated for minor street intersections along the two segments (Oak St. to 3rd St. and 3rd St. to 5th St.) were added into the segment crash totals.
[2] Major Street AADT/Minor Street AADT for intersections.
[3] Under the 5-lane scenario, the corridor has more capacity; therefore more regional traffic is drawn to this corridor. The decrease shown is for overall crashes, so a normalized analysis would show a slightly greater decrease.

Results (see Table 6):

- Changes in crash frequencies are quantified and compared to the no-build scenario. The resulting forecast crash frequencies for Alternatives 1 and 2, 15.7 and 25.8 crashes respectively, are compared to the no-build crash frequency, 29.6. The difference is quantified as a percentage.
- The change in crash frequency can now be considered as one of the trade-offs similar to traffic operations, environmental impacts, and pedestrian and bicycle mobility.

Agencies can take these steps to begin using the HSM.

Section 6: Getting Started

Highway agencies interested in using the HSM methodologies in their safety management and project development processes should consider taking the following next steps toward implementation.

Purchase the HSM

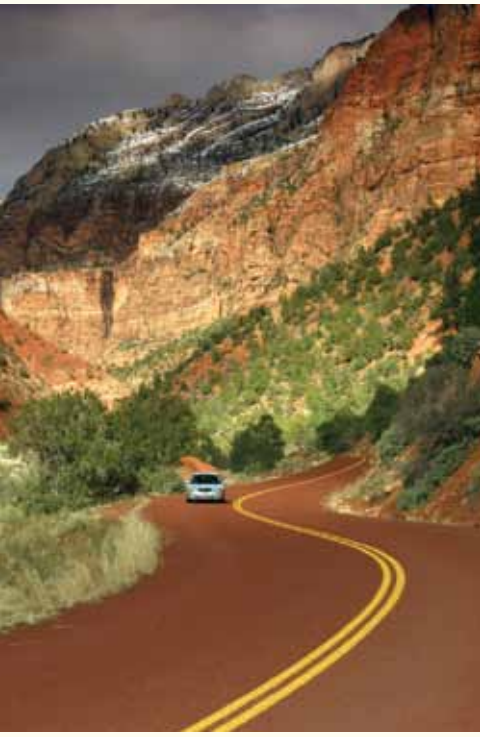
The HSM is currently available for purchase from AASHTO for $325 for AASHTO members and $390 for non-members. Discounts are available for those states taking HSM training. Both hard copy and electronic versions are available. To purchase, visit http://bookstore.transportation.org and search under code HSM-1.

Develop an Agency Training Plan

The HSM methodologies may necessitate some changes in the way highway agencies analyze data, screen their network, and review alternatives for projects. In order to fully understand the methods of the HSM, it will be important for agency personnel to pursue training. NCHRP Project 17-38 is currently underway to develop an HSM overview training course (NHI 380106). In addition, a number of training opportunities available through the National Highway Institute (NHI) are identified in Section 7. The NHI courses can assist agencies in understanding how to apply the HSM methods to the agency's program and in using the safety analysis tools that execute HSM methodology.

Review Software Tools

A number of software programs have been developed to support practitioners' use of the HSM methodologies.



- ***SafetyAnalyst*** provides a set of software tools used by state and local highway agencies for highway safety management. It incorporates state-of-the-art safety management approaches into computerized analytical tools for guiding the decision-making process to identify safety improvement needs and develop a systemwide program of site-specific improvement projects. *SafetyAnalyst* is applicable to Part B of the HSM. The *SafetyAnalyst* software is available through AASHTO, and additional information can be found at www.safetyanalyst.org.
- The ***Interactive Highway Safety Design Model (IHSDM)*** is a suite of software analysis tools for evaluating safety and operational effects of geometric design decisions on highways. It checks existing or proposed highway designs against relevant design policy values and provides estimates of a design's expected safety and operational performance. The IHSDM performs the predictive method for the facilities in Part C of the first edition of the HSM (i.e., two-lane, two-way rural roads, rural multilane highways, and urban and suburban arterials). The IHSDM website summarizes the capabilities and applications of the evaluation modules and provides a library of the research reports documenting their development. Information is available at the public software website, www.ihsdm.org, where users can register and download the latest release of IHSDM.
- The ***Crash Modification Factors Clearinghouse*** houses a web-based database of CMFs along with supporting documentation to help transportation engineers identify the most appropriate countermeasure for their safety needs. Using this site at www.cmfclearinghouse.org, users are able to search for existing CMFs or submit their own CMFs to be included in the clearinghouse.

Develop an Agency HSM Implementation Plan

Incorporating the HSM into an agency's processes will take a concerted effort that should begin with a plan of action. A number of state DOTs have begun planning for the HSM by developing agency-specific training programs, and incorporation of the software tools previously discussed. The Federal Highway Administration (FHWA) is developing an HSM Implementation Plan Guide for State Highway Agencies to be released in late 2010. It will provide strategies to assist with HSM deployment activities at the state level.

Assess Crash Data

An agency should assess its crash data to see if assistance is needed to prepare it for the rigors of HSM analysis. FHWA will provide technical assistance and support to states in evaluating their data systems against data requirements in Part B of the Manual. A technical support staff with intimate knowledge of Part C is also available to answer questions through the FHWA Geometric Design Lab.

Stay Updated

The most up-to-date information on training, technical support, and marketing materials is available at AASHTO's Highway Safety Manual website, www.highwaysafetymanual.org.

Section 7: Resources

- Highway Safety Manual website: www.highwaysafetymanual.org
- Purchase the HSM: http://bookstore.transportation.org. Search under code HSM-1.
  - Cost: $325 (Members), $390 (Non-members)
  - Discounts are available for those states taking HSM training
- IHSDM website: http://www.ihsdm.org
- SafetyAnalyst website: http://www.safetyanalyst.org
- Crash Modification Factors Clearinghouse: http://www.cmfclearinghouse.org
- NCHRP Research Results Digest 329: www.trb.org/Publications/Blurbs/Highway_Safety_Manual_ Data_Needs_Guide_159984.aspx
- Training courses available at http://nhi.fhwa.dot.gov
  - New Approaches to Highway Safety Analysis (NHI-380075)
  - HSM Practitioners Guide to Two-Lane Rural Roads (NHI-380070A)
  - HSM Practitioners Guide to Multilane Urban/Suburban Highways (NHI-380070B)
  - HSM Application to Intersections (NHI-380105*)
  - HSM Workshop (NHI-380106*)
  - Application of Crash Reduction Factors (NHI-380093)
  - Science of Crash Reduction Factors (NHI-380094)
  - Interactive Highway Safety Design Model (IHSDM) (NHI-380071, NHI-380100* web-based)

**Course under development*

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For more information, visit the *Highway Safety Manual* website:
www.highwaysafetymanual.org

HSM
Highway Safety Manual
AASHTO

CRASH MODIFICATION FACTORS **IN PRACTICE**

INTRODUCTION TO SAFETY PERFORMANCE FUNCTIONS

DEFINITION A safety performance function (SPF) is an equation used to predict the average number of crashes per year at a location as a function of exposure and, in some cases, roadway or intersection characteristics (e.g., number of lanes, traffic control, or median type) *(1)*. For highway segments, exposure is represented by the segment length and annual average daily traffic (AADT) associated with the study section as shown by the sample SPF in Equation 1.

$$\text{Predicted Crashes} = \exp[a + \beta * \ln(\text{AADT}) + \ln(\text{Segment Length})] \quad \{1\}$$

For intersections, exposure is represented by the AADT on the major and minor intersecting roads as shown by the sample SPF in Equation 2.

$$\text{Predicted Crashes} = \exp[a + \beta_1 * \ln(\text{AADT}_{major}) + \beta_2 * \ln(\text{AADT}_{minor})] \quad \{2\}$$

Example 1: The SPF from the Highway Safety Manual (1) for total multiple-vehicle (MV) crashes at urban, four-legged signalized intersections using Equation 2 where a, β1 and β2 were calculated separately is:

$$\text{Predicted MV crashes} = \exp[-10.99 + 1.07*\ln(\text{AADT}_{major}) + 0.23*\ln(\text{AADT}_{minor})]$$

For an urban, four-legged signalized intersection with a major road traffic volume ($AADT_{major}$) of 25,000 vehicles per day and a minor road traffic volume ($AADT_{minor}$) of 10,000 vehicles per day, the predicted number of MV crashes is computed as follows for the given SPF.

$$\text{Predicted MV crashes} = \exp[-10.99 + 1.07*\ln(25{,}000) + 0.23*\ln(10{,}000)] = 7.13 \text{ crashes/year}$$

APPLICATION SPFs are used to predict crash frequency for a given set of site conditions. The predicted crashes from the SPF can be used alone or in combination with the site-specific crash history (i.e., Empirical Bayes method) to compare the safety performance of a specific site under various conditions. The Empirical Bayes method is used to estimate the ***expected*** long-term crash experience, which is a weighted average of the ***observed*** crashes at the site of interest and the ***predicted*** crashes from an SPF *(2)*.

The predicted number of crashes calculated using SPFs is instrumental for a number of activities in the project development process, including: 1) network screening, 2) countermeasure comparison, and 3) project evaluation.

1) Network Screening

SPFs can be used in the network screening process to determine whether the observed safety performance at a given location is higher or lower than the average safety performance of other sites with similar roadway characteristics and exposure. This is useful in the safety management process to identify sites with potential for safety improvement.

2) Countermeasure Comparison

SPFs can be used to predict the baseline crash frequency for given site conditions when comparing potential countermeasures. SPFs are used alone or in conjunction with the crash history to estimate the long-term crash frequency for baseline conditions (without treatment) and crash

References

1. American Association of State Highway and Transportation Officials (AASHTO). *Highway Safety Manual*, 1st Edition, Washington, DC, 2010.
2. Hauer, E. *Observational before-after studies in road safety*. Pergamon Press, Elsevier Science Ltd., Oxford, England, 1997.
3. Introduction to Crash Modification Factors. Federal Highway Administration. Available online at: http://safety.fhwa.dot.gov/tools/crf/resources/cmfs/.
4. Van Schalkwyk, I., Wemple, E.A., and Neuman, T.R. *Integrating the HSM into the Highway Project Development Process*. Publication FHWA-SA-11-50, Federal Highway Administration, Washington, DC, 2012.

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modification factors (CMFs) are applied to estimate the crashes with treatment as shown in Equation 3. This is useful in activities where there are multiple alternatives to address safety concerns and it is desirable to quantify and compare the potential benefits of each treatment. Readers can refer to the *Introduction to Crash Modification Factors* for more information on CMFs and how they are applied *(3)*.

Predicted Crashes WITH Treatment = CMF * Predicted Crashes WITHOUT Treatment {3}

Example 2: Estimate the change in predicted crashes for installing left-turn lanes on two of the approaches at an urban, four-legged signalized intersection with a major road traffic volume ($AADT_{major}$) of 25,000 vehicles per day and a minor road traffic volume ($AADT_{minor}$) of 10,000 vehicles per day. The CMF for installing left-turn lanes on two approaches at an urban, four-legged signalized intersection is 0.81 (1).

*Predicted crashes WITH treatment = CMF * Predicted crashes WITHOUT treatment (from Example 1)*

*Predicted crashes WITH treatment = 0.81 * 7.13 crashes/year = 5.78 crashes/year*

The change in predicted crashes is a reduction of 1.35 crashes per year (7.13 – 5.78 crashes per year).

3) Project Evaluation

It is important to evaluate the safety effectiveness of roadway improvements to provide input to future planning, policy and programming decisions. The current state-of-the-practice is to employ the Empirical Bayes method in an observational before-after study to develop CMFs. SPFs are a critical component of the Empirical Bayes method, which combines the crash history for a given site with the predicted crashes from an SPF. In particular, the SPF helps to account for changes in traffic volume over time.

CALIBRATION SPFs are developed using data from specific locations at a specific period in time and represent the average conditions for a given facility type. As such, it may be necessary to adjust the SPF through calibration to better reflect your local conditions or a different study period. A calibration procedure is presented in the *Highway Safety Manual* to reflect local conditions or a different study period *(1)*. It is also necessary to adjust the SPF when the conditions at the site of interest differ from the average conditions. The *Highway Safety Manual* identifies the base conditions for each SPF and provides applicable adjustment factors (i.e., CMFs) *(1)*. CMFs are applied using Equation 4.

Adjusted Predicted Crash Frequency = CMF * Base Predicted Crash Frequency {4}

Example 3: Consider a scenario where it is desirable to predict crashes for a rural, two-lane study section with a segment length (L) of 2.0 miles and an AADT of 2,500 vehicles per day. It is determined that the roadway of interest has 11-ft lanes, while the base condition for the applicable SPF in the Highway Safety Manual is for a roadway with 12-ft lanes. All other conditions are similar to the base conditions. In this case, it is necessary to adjust the predicted crash frequency to reflect the different base condition using Equation 4. From the Highway Safety Manual, the applicable CMF for 11-ft lanes is 1.05 (1). The SPF for total crashes on rural, two-lane roads is similar to Equation 1 where a and β were calculated separately and shown in the following equation (1).

*Predicted total crashes = exp[-15.22 + 1.68*ln(AADT) + ln(L)]*

*Base predicted crash frequency = exp[-15.22 + 1.68*ln(2,500) + ln(2.0)] = 0.25 crashes/year*

*Adjusted predicted crash frequency = CMF * Base predicted crash frequency*

*Adjusted predicted crash frequency = 1.05 * 0.25 crashes per year = 0.26 crashes per year*

Readers can refer to the *Highway Safety Manual (1)* and FHWA's *Integrating the HSM into the Highway Project Development Process (4)* for additional information and examples. The *Highway Safety Manual* provides specific SPFs for various facility types and details regarding the calibration process.

www.CMFClearinghouse.org

CMF

CRASH MODIFICATION FACTORS CLEARINGHOUSE

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What is a crash modification factor (CMF)?

A CMF is an estimate of the change in crashes expected after implementation of a countermeasure. For example, an intersection is experiencing 100 angle crashes and 500 rear-end crashes per year. If you apply a countermeasure that has a CMF of 0.80 for angle crashes, then you can expect to see 80 angle crashes per year following the implementation of the countermeasure (100 x 0.80 = 80). If the same countermeasure also has a CMF of 1.10 for rear-end crashes, then you would also expect to also see 550 rear-end crashes per year following the countermeasure (500 x 1.10 = 550).

About the CMF Clearinghouse

The CMF Clearinghouse, available at www.CMFClearinghouse.org, offers transportation professionals a central, Web-based repository of CMFs, as well as additional information and resources related to CMFs. The CMF Clearinghouse was established to provide transportation professionals:

- A regularly updated, online repository of CMFs,
- A mechanism for sharing newly developed CMFs, and
- Educational information on the proper application of CMFs.

Both CMFs and Crash Reduction Factors are presented in the clearinghouse because both are widely used in the field of traffic safety.

Features of the CMF Clearinghouse

- Use the "Quick search" on the homepage to search by keyword, countermeasure, crash type, crash severity and/or roadway type
- Use the "Advanced Search" feature to search by more parameters, such as intersection type, traffic control, and whether the CMF is included in the Highway Safety Manual
- Submit your own CMF studies to be included in the clearinghouse
- Learn more about applying CMFs in the About CMF section
- Get resources on CMF-related trainings and publications

Rating CMF quality

The CMF Clearinghouse developed a star quality rating system to indicate the quality or confidence in the results of the study producing the CMF. While the reviewers applied as objective as possible set of criteria—study design, sample size, standard error, potential bias, and data source—the star quality rating still results from an exercise in judgment and a degree of subjectivity. The star rating is based on a scale (1 to 5), where a 5 indicates the highest or best rating.

How can I use the CMF Clearinghouse?

Visit the CMF Clearinghouse at www.CMFClearinghouse.org to:

- Learn more about CMFs
- Identify potential countermeasures
- Obtain the expected effectiveness of countermeasures
- Compare alternative treatments
- Get information on trainings related to CMFs
- Find resources on cost-benefit analysis

www.CMFClearinghouse.org

The CMF Clearinghouse is funded by the U.S. Department of Transportation Federal Highway Administration and maintained by the University of North Carolina Highway Safety Research Center.

Safe Roads for a Safer Future
Investment in roadway safety saves lives

FHWA-SA-10-008

CRASH MODIFICATION FACTORS IN PRACTICE

INTRODUCTION TO CRASH MODIFICATION FACTORS

DEFINITION A crash modification factor (CMF) is a measure of the safety effectiveness of a particular treatment or design element.

APPLICATION CMFs are applied to the estimated crashes *without* treatment to compute the estimated crashes *with* treatment, as shown by Equation 1.

Estimated Crashes WITH Treatment = CMF * Estimated Crashes WITHOUT Treatment {1}

A CMF less than 1.0 indicates that a treatment has the potential to reduce crashes.

Example: A CMF for total crashes for installing centerline rumble strips on rural major collector roads has been estimated to be 0.86 (1). This CMF indicates that the frequency of total crashes with the treatment is estimated to be 86 percent of the estimated crash frequency without the treatment. In other words, the CMF indicates that there will be a 14 percent reduction in total estimated crash frequency.

A CMF greater than 1.0 indicates that a treatment has the potential to increase crashes.

Example: A CMF for total crashes for converting an urban four-lane cross-section to a five-lane cross-section has been estimated to be 1.11 (2). This CMF indicates that there will be an 11 percent increase in the estimated total crash frequency.

The application of an appropriate CMF can influence the decision to implement a particular project, and the misapplication of CMFs can lead to misinformed decisions. Key factors to consider when applying CMFs include: 1) selection of an appropriate CMF, 2) estimation of crashes without treatment, 3) application of CMFs by type and severity, and 4) estimation of the combined effect for multiple treatments.

Selecting an Appropriate CMF

The CMF selection process involves several considerations, including the availability of related CMFs, the applicability of available CMFs, and the quality of applicable CMFs. The key to selecting an appropriate CMF is to identify the CMF that best matches the scenario at hand.

Availability: The *Highway Safety Manual (HSM) (3)* and *CMF Clearinghouse (4)* are the two primary sources of CMFs.

Applicability: Several variables can be used to match a CMF to a given scenario including treatment type, roadway type, area type, segment or intersection geometry, segment or intersection traffic control, traffic volume, and state from which the CMF was developed. The HSM and CMF Clearinghouse provide information to help users identify applicable situations.

Quality: If multiple applicable CMFs exist for a given treatment, then the quality or standard error can be used to differentiate the results. The CMF Clearinghouse provides quality ratings for CMFs which may be used for this purpose. In the absence of a quality rating, CMFs may be compared by their

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standard error where a smaller standard error indicates a greater level of certainty for a CMF estimate.

Ultimately, CMFs should be applied to situations that closely match those from which the CMF was developed. However, it is critical for practitioners to use engineering judgment when a CMF is not available for the situations encountered as there are some cases for which a CMF that was developed for different conditions might be the best available.

Estimating Crashes without Treatment
The CMF is applied to the estimated crashes *without treatment* to estimate crashes *with* treatment (assuming the countermeasure of interest is implemented). Hence, the safety performance *without treatment* has to be estimated before applying CMFs. The HSM presents several methods for estimating the safety performance of a roadway or intersection. The most simplistic method to estimate crashes without treatment is to compute the long-term (i.e., 5+ years) average crash frequency before treatment. In this method, it is assumed that the crash history before treatment will represent the future safety performance in the absence of changes. The Empirical Bayes method, described in the HSM, is a more rigorous method for estimating crashes without treatment as it combines information from the site of interest with information from other similar sites.

Applying CMFs by Type and Severity
CMFs may apply to total crashes or to target crash types and severities. It is often useful to estimate the change in crashes by type and severity, but this should only be done when there are CMFs available for the specific crash types and severities in question. The crash type associated with a CMF defines the crashes for which the related CMF is applicable. Crash severity is defined by the most severe outcome of those involved in the crash. It is not appropriate to apply a CMF for a specific crash type or severity to other crash types and severities because a countermeasure may reduce certain crash types or severities while increasing other crash types and severities.

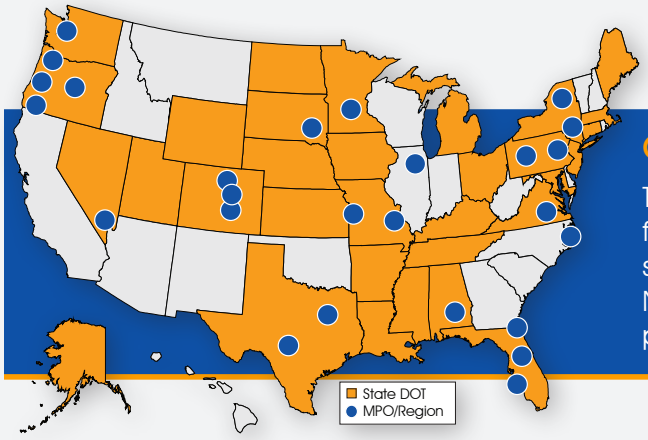
Estimating the Effects of Multiple Treatments
There are relatively few studies that estimate CMFs for combinations of countermeasures. It is far more common for studies to estimate CMFs for individual countermeasures. Consequently, it is difficult to accurately estimate the effects of combinations of countermeasures. Methods have been proposed for combining the CMFs developed from individual countermeasures to approximate the effect of multiple countermeasures, but there has been little research to support any specific method. The current practice for many agencies is to assume that CMFs are multiplicative; this is the current method presented in the *HSM (3)* and posted on the *CMF Clearinghouse (4)*. In brief, this proposed approach (and many of the alternatives) is problematic in the sense that applying the combined CMF may overestimate or underestimate the true crash effects, particularly if the countermeasures target similar crash types. More information regarding the application of multiple CMFs is available in recent articles *(5, 6)*.

Readers can refer to the CMF Clearinghouse for more information (www.cmfclearinghouse.org). The CMF Clearinghouse includes a web-based database of CMFs along with supporting documentation to help users identify the most appropriate countermeasure for their safety needs.

REFERENCES

1. Persaud, B. N., Retting, R. A., and Lyon, C., "Crash Reduction Following Installation of Centerline Rumble Strips on Rural Two-Lane Roads." Insurance Institute for Highway Safety, Arlington, VA, 2003.
2. Bauer, K. M., Harwood, D. W., Hughes, W. E., and Richard, K. R., "Safety Effects of Narrow Lanes and Shoulder-Use Lanes to Increase Capacity of Urban Freeways." In, *Transportation Research Record: Journal of the Transportation Research Board, No. 1897*, Transportation Research Board of the National Academies, Washington, D.C., 2004.
3. American Association of State Highway and Transportation Officials (AASHTO). *Highway Safety Manual*, 1st Edition, Washington, DC, 2010.
4. Crash Modification Factors (CMF) Clearinghouse. Federal Highway Administration. Available online at: www.cmfclearinghouse.org
5. Gross, F. and Yunk, K. "Crash Modification Factors: An Overview of Its Applications." *Public Roads*. Federal Highway Administration, Washington, D.C., 2011.
6. Gross, F., Hamidi, A., and Yunk, K. *Investigation of Existing and Alternative Methods for Combining Multiple CMFs*. Federal Highway Administration, Washington, D.C., 2011.

PLANNING SNAPSHOT 7:
CRASH DATA



JANUARY 2016

Funded through the NCHRP 8-36 Research Series, these snapshots are designed to tell you a little about the current state of a specific planning practice of interest today.

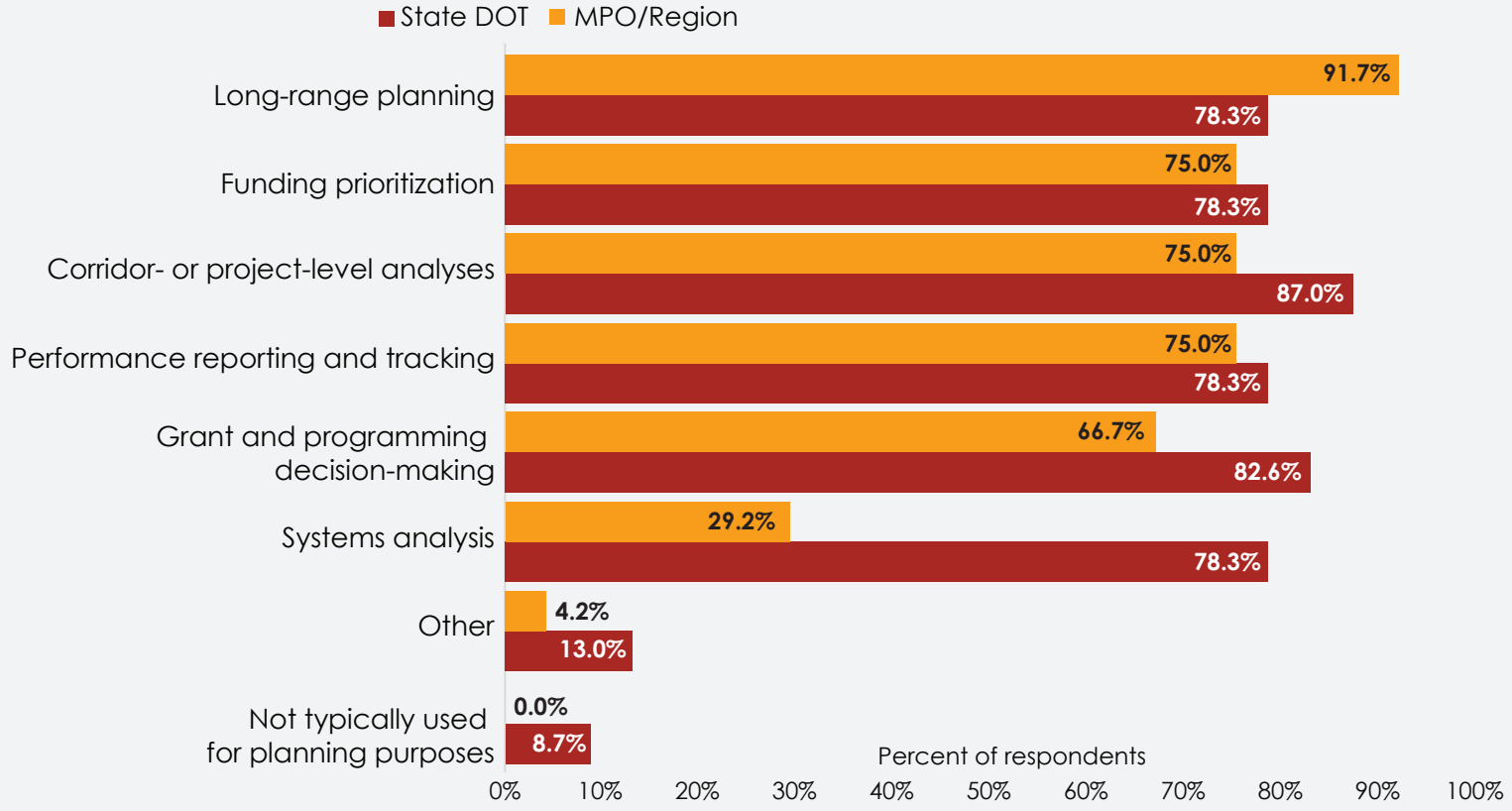
Crash Data Applications for Planning

To better understand how crash data is collected, analyzed, and applied for planning, **transportation planners** and **crash data managers** were surveyed. This survey was distributed on behalf of SCOP, AMPO, and NARC. **33 state agencies and 27 regional organizations** responded – providing the insights and information shared here.

CRASH DATA WIDELY USED FOR PLANNING

Beyond traditional applications, safety data is increasingly informing planning and decision-making

How is safety and crash data typically used for planning purposes?



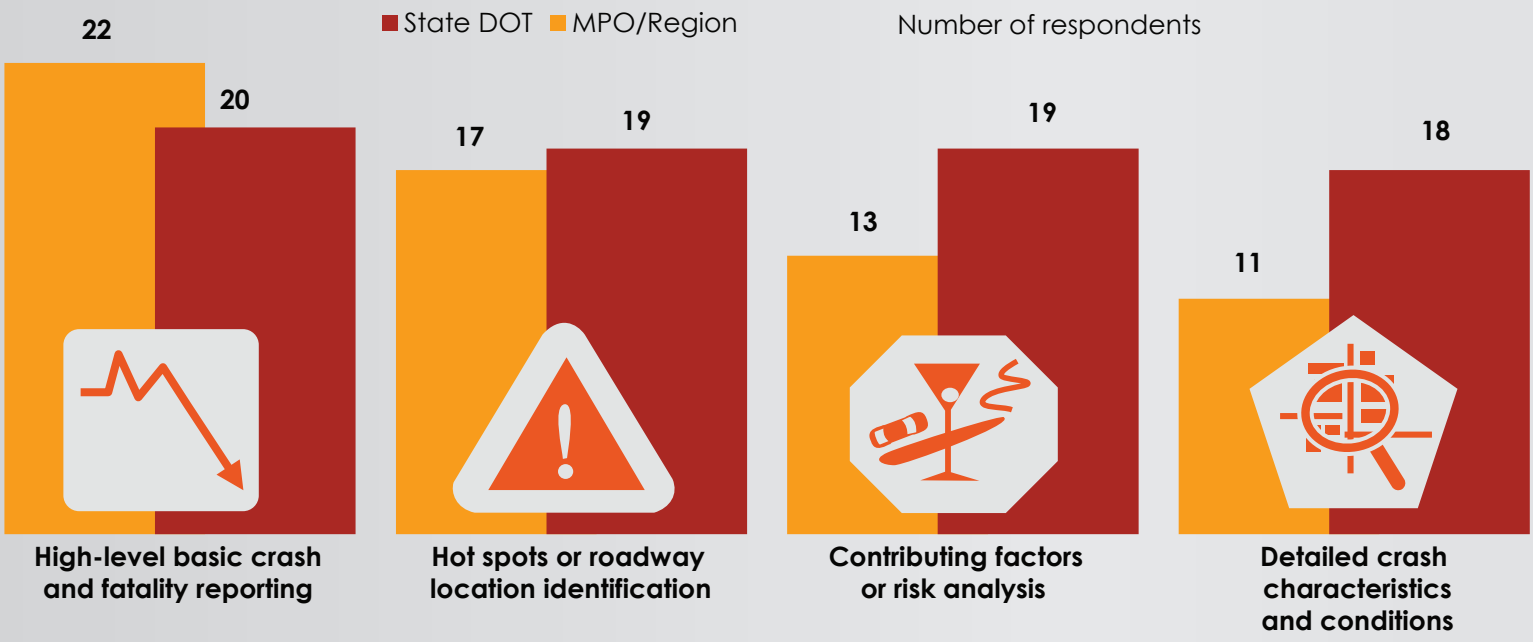
Other applications of safety data include: project scoping, design and operational analysis, diagnostic assessment, safety specific studies, sketch planning, and community engagement activities

PLANNING SNAPSHOT 7:
CRASH DATA

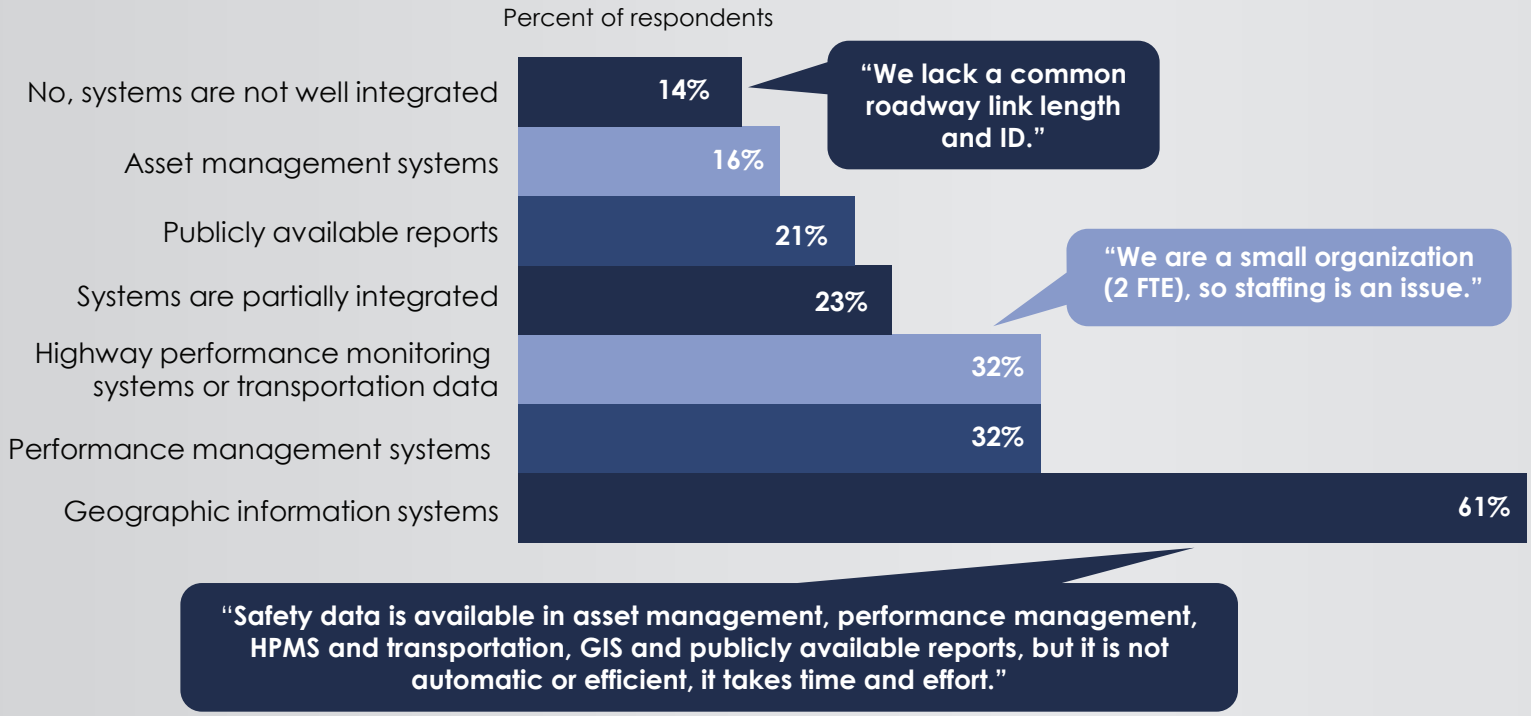
ANALYZING CRASH DATA YIELDS INSIGHTS?

Safety data is commonly used to identify trends and pinpoint needs, but also increasingly integrated with agency-wide management and information systems

What analyses are commonly performed and what can the data tell you?



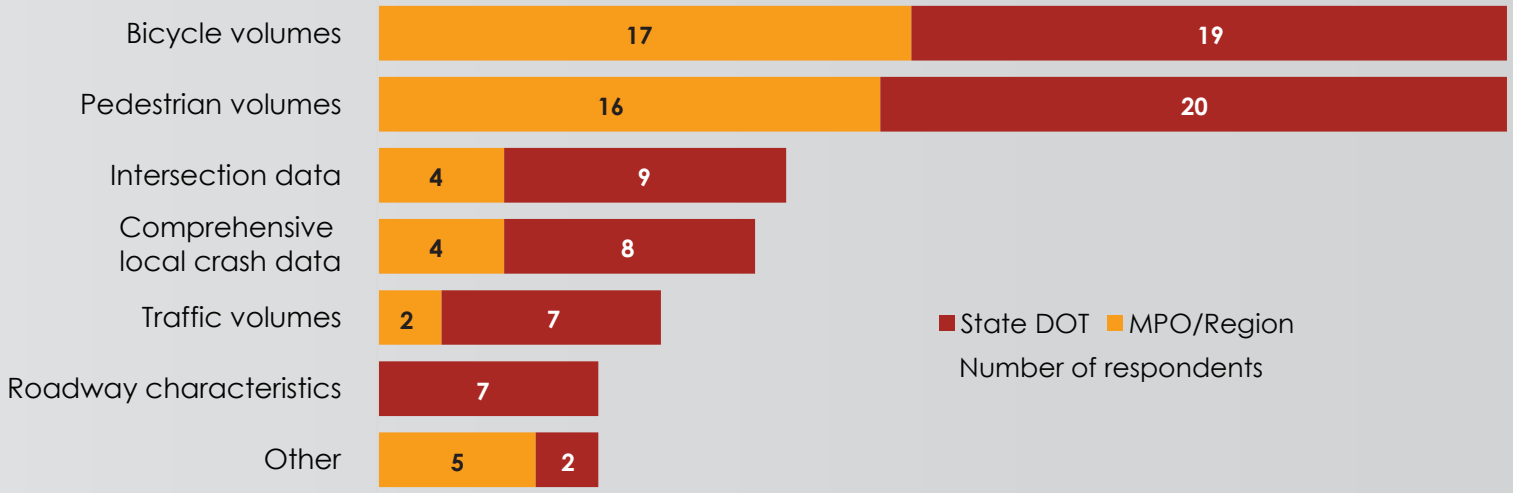
Is crash data integrated with other transportation data or information systems?



BICYCLE AND PEDESTRIAN CRASH DATA WIDELY SOUGHT

States and MPOs agree, bicycle and pedestrian volumes would be helpful for planning and policy

What data is currently not available that would be helpful in policy and planning?



IN-DEPTH LOOK AT BICYCLE AND PEDESTRIAN CRASH DATA NEEDS

Despite challenges, many agencies collect bicycle and pedestrian crash data involving a motor vehicle

Does your agency collect bicycle and pedestrian crash data?

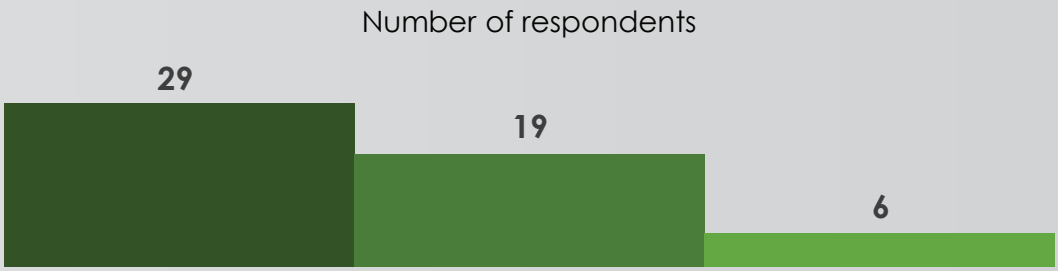
If no, what are some challenges to collecting bicycle/ pedestrian data

"Lack of resources, or low priority"

"Low-severity crashes often not reported or underreported"

"Difficult to collect data on crashes that do not involve a motor vehicle"

If yes, what types of bicycle/pedestrian data are collected?



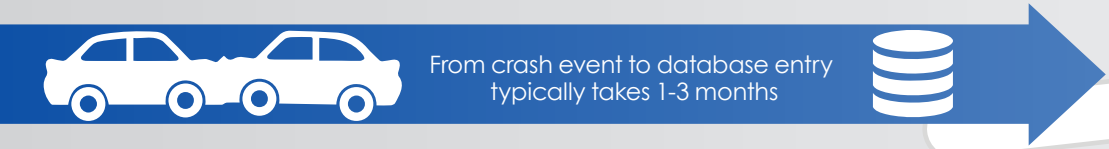
PLANNING SNAPSHOT 7:
CRASH DATA

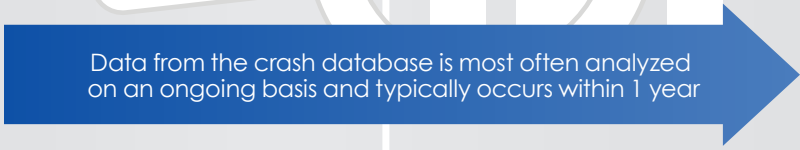
CRASH DATA PROCESSES ARE STREAMLINED AND EFFICIENT, BUT COORDINATION CHALLENGES PERSIST

Does your agency have difficulty providing processed data to safety analysts in time for analysis?

Percent of respondents

Typical timeline of data collection to analysis





What agency is primarily responsible *for collecting and long-term storage* of crash reports and data?

What agency is primarily responsible for *analyzing, utilizing, and distributing crash data* for planning purposes?

Dept. of Public Safety/State Police

Dept. of Transportation

Dept. of Motor Vehicles

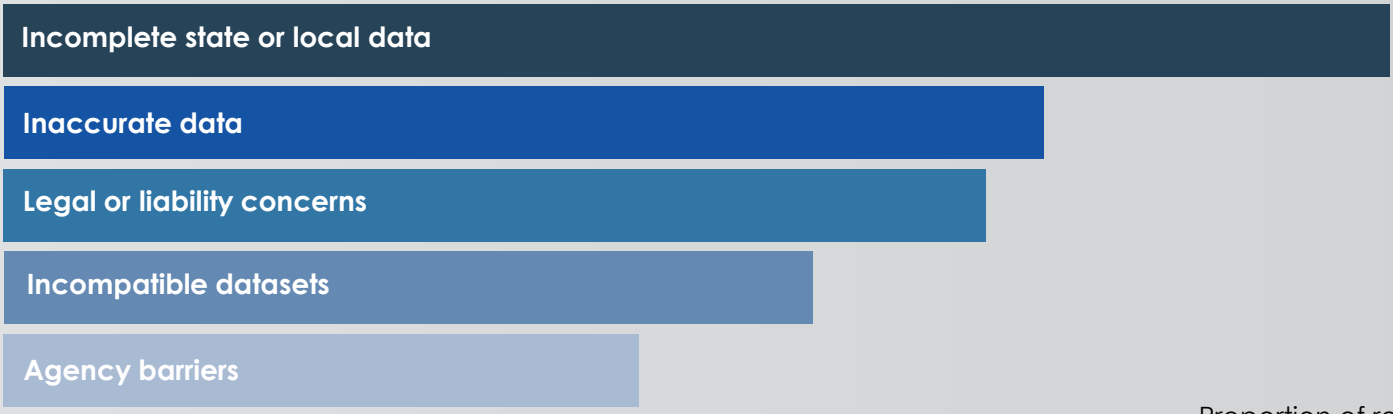
University or Contractor

Dept. of Public Health

Number of respondents

DATA CHALLENGES COMMON, EVEN WITH INCREASED INTEREST AND APPLICATION OF SAFETY DATA

What challenges or obstacles has your agency encountered in working with, analyzing, or sharing crash data?

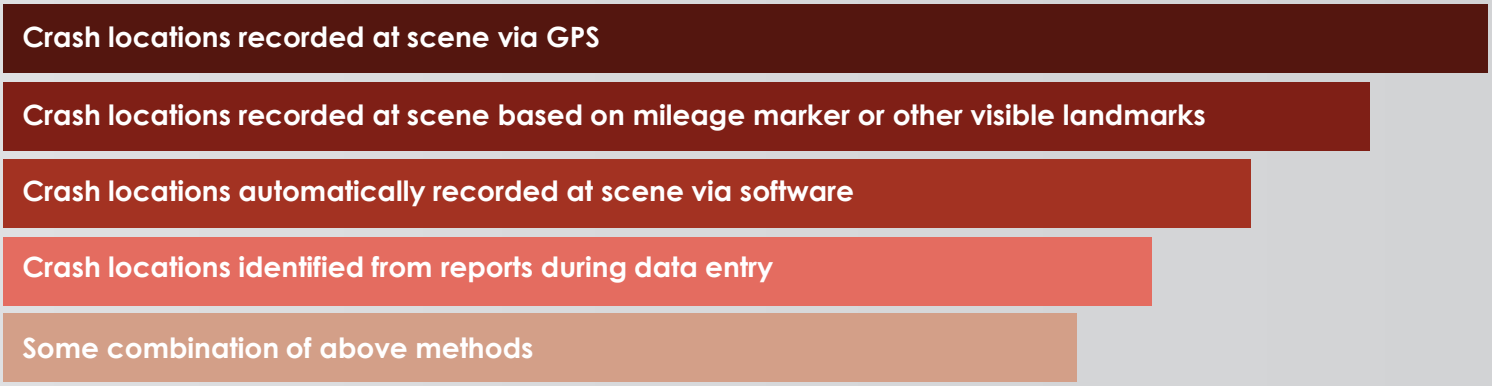


Proportion of respondents

CRASH DATA LOCATION AND QUALITY ASSURANCE

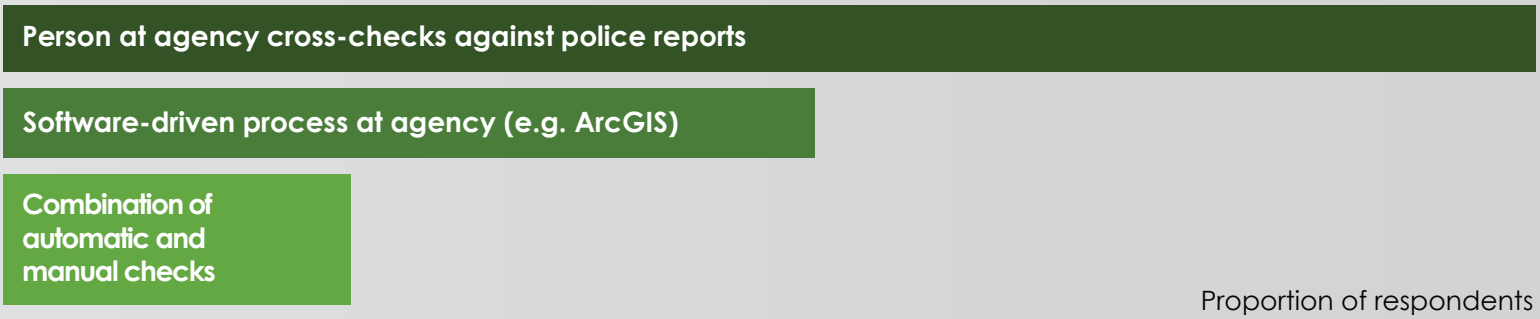
States use both automated and manual processes to conduct QA/QC on crash data

How does your state generate location data for crash reports?



Proportion of respondents

How is locational accuracy and quality control conducted?



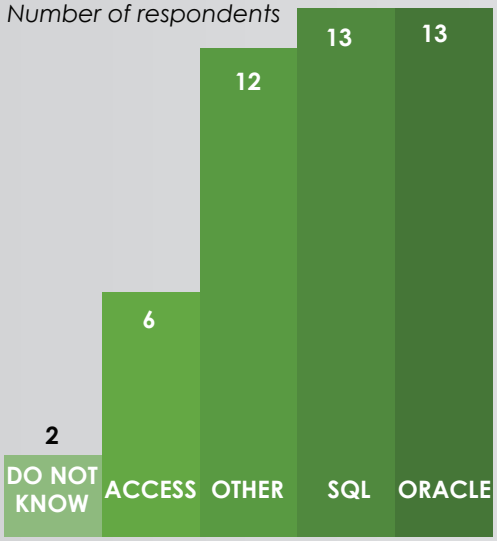
Proportion of respondents

PLANNING SNAPSHOT 7: CRASH DATA

VARIETY OF TOOLS USED TO MANAGE CRASH DATA

Many agencies use some combination of proprietary software and in-house tools to find storage and analysis options that meet their individual needs

What databases do agencies use to store crash data?



"OTHER" includes: DB2, ESRI File Geodatabase, agency dashboard

PROS?

- ✓ Very fast and handles spatial data quickly
- ✓ From crash event to entry in database is less than three days
- ✓ More scalable and better performance – custom queries are easy and the queries run quickly
- ✓ Allows flexibility in designing user interfaces
- ✓ Easy to use, familiar platform

CONS?

- × Expertise is lacking, state IT restricts many of the software's enhanced functions, and high performance is cost prohibitive
- × Software takes time to learn and requires a lot of storage, need to know the intricacies of data relationships to ensure proper output data
- × Program makes it difficult to maintain and organize data across many years

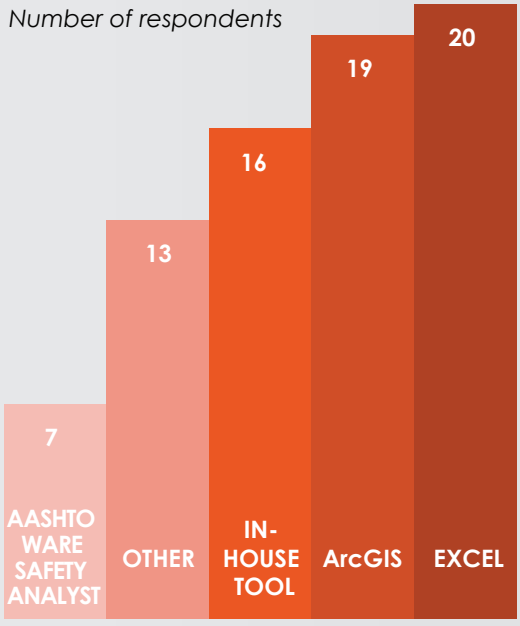
What tools do agencies use to conduct analysis of crash data?

PROS?

- ✓ Tool is widely used and easy for most people
- ✓ Tool has a graphical interface
- ✓ Our in-house tool allows us to quickly query crash data and export to other programs
- ✓ Software is great for sharing data with the public

CONS?

- × Too few individuals proficient in the software
- × Our in-house tool is based on very old technology and static network data
- × We offer a simplified tool for the public but there is no user manual and we often get asked questions
- × Program requires too much data from many systems

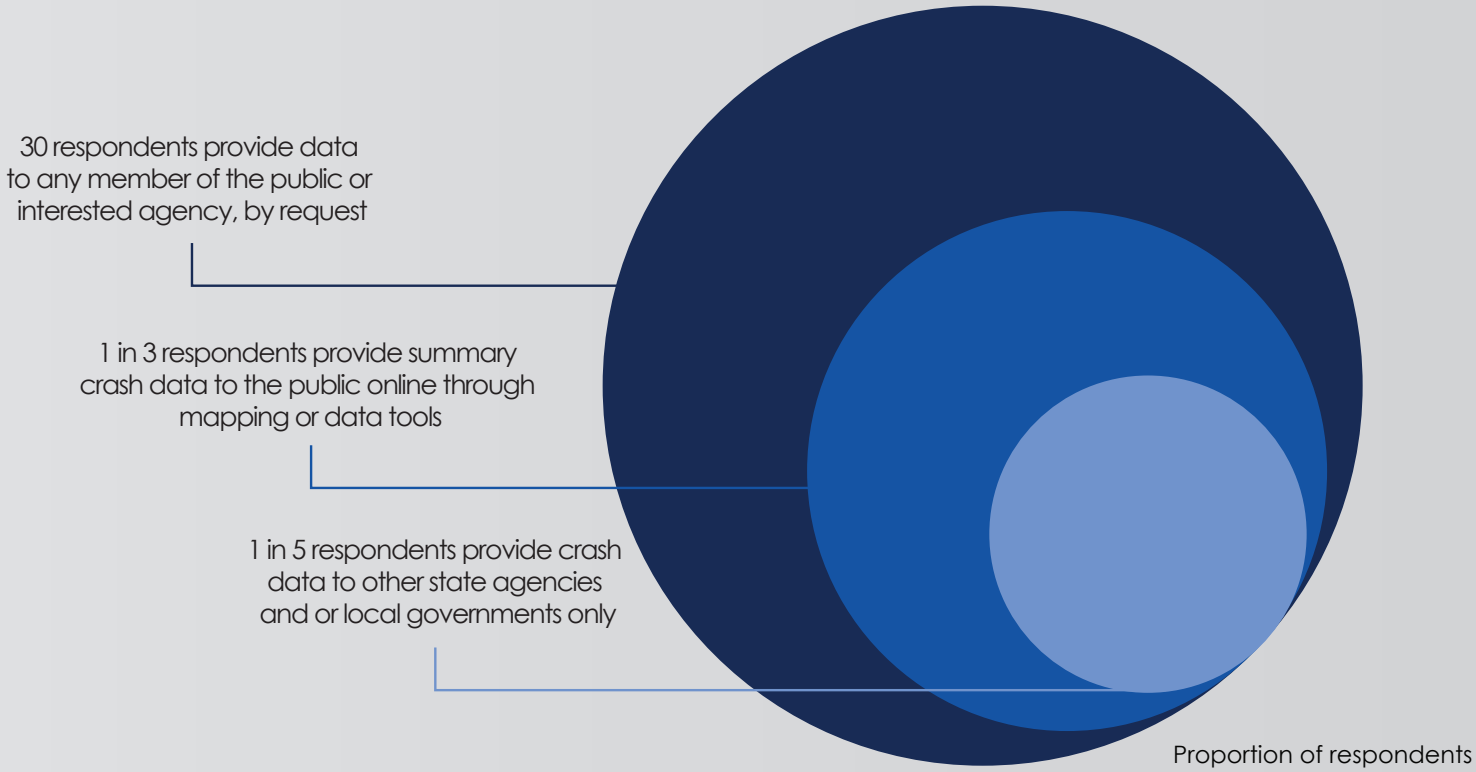


"OTHER" includes: Tableau, R, Critical Analysis Reporting Environment

MOST AGENCIES SHARE AND COMMUNICATE CRASH DATA

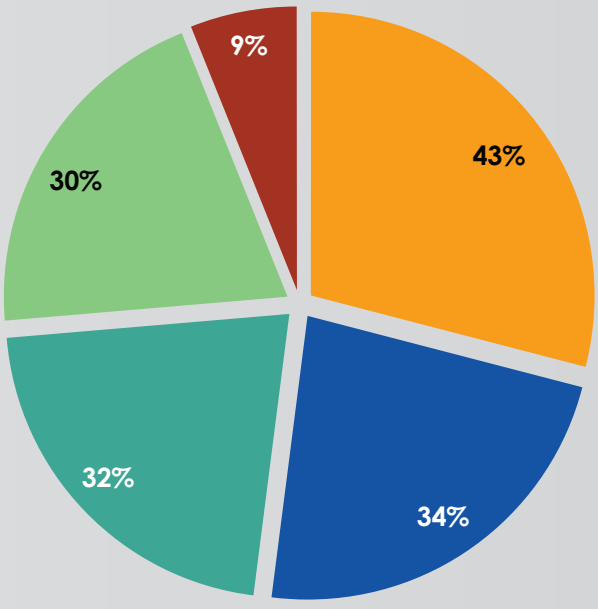
All agencies release crash data by request, and over one-third of agencies also use online tools to disseminate crash data information

Who has access to cleaned crash data?



How does your agency make crash data available to local and regional planning partners?

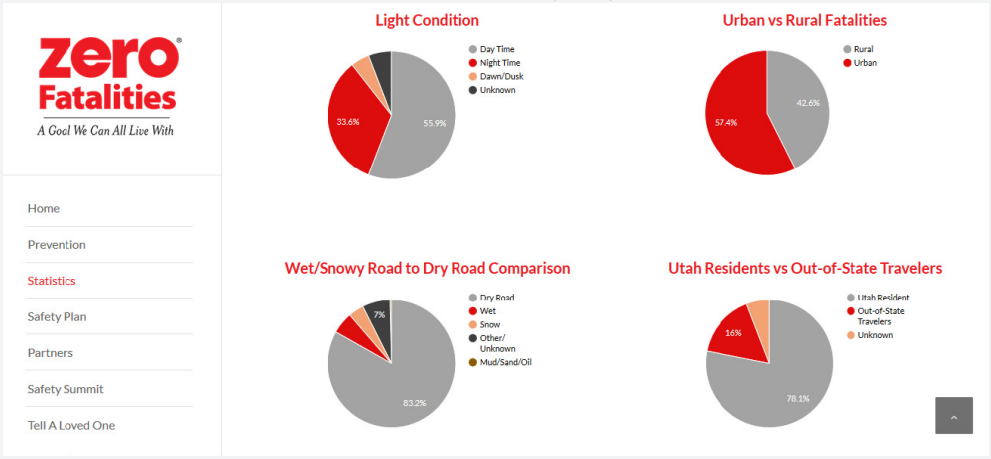
Examples of DOT and agency websites for communicating crash data are provided on the following page. Many state and regional agencies make safety data available and accessible in creative and innovative ways.



Percent of respondents, multiple responses allowed

PUBLIC DATA AND COMMUNICATIONS

Many states and regions provide detailed crash reports and maintain creative and accessible crash data online. A few examples are highlighted here, more can be found through NHTSA.

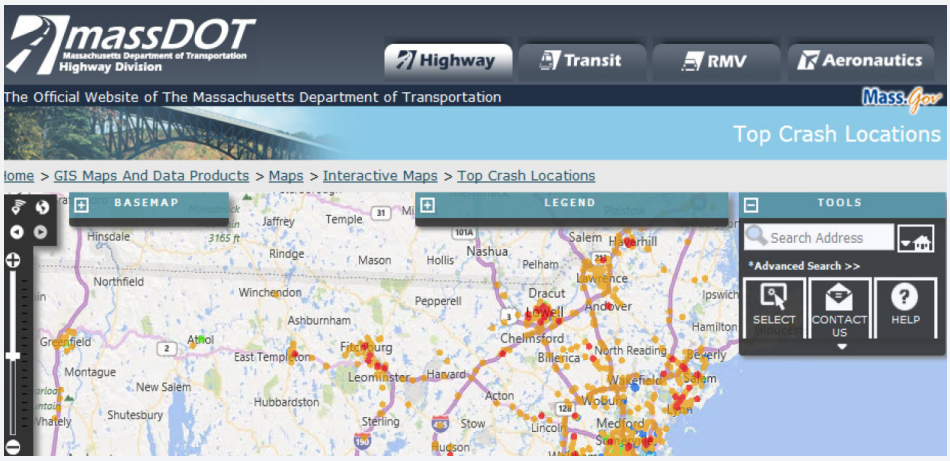


Utah's Zero Fatalities website includes interactive statistics and data for key crash factors and characteristics. Arizona, Nevada, and Iowa maintain similar sites through the national zero fatalities initiative.

See more at:
http://ut.zerofatalities.com

The Louisiana Crash Data Reports website is a compilation of statistical data on a wide variety of topics linked to SHSP implementation. Crash data is maintained and visualized by LSU.

See more at:
http://datareports.lsu.edu/



MassDOT maintains an interactive map showing Top Crash Locations statewide; automated procedures were developed for processing, standardizing, matching, and aggregating the crash data by geographical location.

See more at:
www.massdot.state.ma.us

For more information about this NCHRP effort and to view additional snapshots please visit www.planningsnapshots.camsys.com.

Acknowledgment of Sponsorship *This work was sponsored by the American Association of State Highway and Transportation Officials (AASHTO), in cooperation with the Federal Highway Administration, and conducted in the National Cooperative Highway Research Program (NCHRP) Project 08-36, Task 120, which is administered by the Transportation Research Board of the National Academies.*

E. Alaska
    1. Form 209, Operators report of accident
    2. Form 200, police report of accident
    3. Crash Data Flow, old and new
    4. CARE Dashboard
    5. HSIP Flowchart

ALASKA MOTOR VEHICLE COLLISION REPORT

SR #: _____ INCIDENT/CASE # _____

OFFICER / AGENCY INFORMATION

OFFICER NAME _____ OFFICER PERM ID _____ AGENCY _____ REVIEWING OFFICER PERM ID _____ REVIEW DATE _____

CRASH INFORMATION - (One choice per field unless otherwise noted - "Other" should be explained in narrative)

LAW ENFORCEMENT USE ONLY | CRASH DATE | CRASH DAY ◯Mo ◯Tue ◯Wed ◯Thu ◯Fri ◯Sat ◯Su | CRASH TIME UNKNOWN ☐ | CRASH TIME

CRASH LOCATION LAT / LONG N: ° ' " W: ° ' "

CRASH CITY / PLACE _____ COUNTY / BOROUGH _____

CRASH CLASSIFICATION

Property: ☐
01 - Public Property
02 - Private Property
99 - Unknown

Location: ☐
01 - Trafficway, on Road
02 - Trafficway, not on Road
03 - Non-Trafficway
In Parking Lot ☐

ON STREET OR HIGHWAY _____ _____ DISTANCE _____ MEASUREMENT ☐
FT - Feet
MI - Miles
IN - At Intersection

DIRECTION ☐
01 - N 05 - NE
02 - E 06 - NW
03 - S 07 - SE
04 - W 08 - SW
97 - N/A
99 - Unknown

FROM INTERSECTION WITH STREET/ NEAREST STREET, BRIDGE, etc. _____ _____

PHOTOS TAKEN ☐ 00 - No 01 - Yes

NON-VEHICULAR PROPERTY DAMAGE ☐ 00 - No 01 - Yes 99 - Unknown

MOST CONTRIBUTING UNIT KNOWN ☐ 00 - No 01 - Yes

TOTAL WITNESSES ☐

TOTAL MOTORIZED UNITS ☐

TOTAL NON-MOTORIZED UNITS ☐

TOTAL MOTORISTS *(person types* 01, 02, 09)* ☐

TOTAL NON-MOTORISTS *(person types* 03, 04, 05, 06, 07, 08, 10, 19)* ☐

FIRST HARMFUL EVENT ☐

Non-Collision:
01 - Overturn/Rollover
02 - Fire/Explosion
03 - Immersion, Full or Partial
04 - Gas Inhalation
05 - Fell/Jumped from Vehicle
06 - Injured in Vehicle (Non-Collision)
16 - Thrown or Falling Object
07 - Other Non-Collision
44 - Pavement Surface Irregularity (Ruts, Potholes, Grates, etc.)
51 - Jackknife
72 - Cargo/Equipment Loss or Shift

Collision with Motor Vehicle In-Transport:
12 - Motor Vehicle In-Transport
54 - Motor Vehicle In-Transport Strikes or is Struck by Cargo, Persons or Objects Set-in-Motion from/by Another Motor Vehicle In-Transport
55 - Motor Vehicle In Motion Outside the Trafficway

Collision with Non-Fixed Object:
08 - Pedestrian
09 - Pedalcycle
10 - Railway Vehicle
11 - Live Animal: _____
14 - Parked Motor Vehicle
15 - Non-Motorist on Personal Conveyance
18 - Other Object (Not Fixed)
45 - Working Motor Vehicle
49 - Ridden Animal or Animal Drawn Conveyance

Collision with Fixed Object:
17 - Boulder
19 - Building
20 - Impact Attenuator/Crash Cushion
21 - Bridge Pier or Support
23 - Bridge Rail (Includes Parapet)
24 - Guardrail Face
25 - Concrete Traffic Barrier
26 - Other Traffic Barrier
30 - Utility Pole/Light Support
31 - Other Post, Other Pole or Other Support
32 - Culvert
33 - Curb
34 - Ditch
35 - Embankment
38 - Fence
39 - Wall
40 - Fire Hydrant
41 - Shrubbery
42 - Tree (Standing Only)
43 - Other Fixed Object
46 - Traffic Signal Support
48 - Snow Bank
50 - Bridge Overhead Structure
52 - Guardrail End
53 - Mail Box
57 - Cable Barrier
58 - Ground
59 - Traffic Sign Support
99 - Unknown

LOCATION OF FIRST HARMFUL EVENT RELATIVE TO TRAFFICWAY ☐
01 - On Roadway
02 - On Shoulder
03 - On Median
04 - On Roadside
05 - Outside Trafficway
06 - Off Roadway - Location Unknown
07 - In Parking Lane/Zone
08 - Gore
10 - Separator
11 - Continuous Left-Turn Lane
99 - Unknown

MANNER OF COLLISION IMPACT ☐
00 - Not a Collision with a Motor Vehicle In-Transport
01 - Front-to-Rear
02 - Front-to-Front
06 - Angle
07 - Sideswipe-Same Direction
08 - Sideswipe-Opposite Direction
09 - Rear-to-Side
10 - Rear-to-Rear
98 - Other
99 - Unknown

WEATHER *(must have 2 choices)* ☐ ☐
00 - No Additional Atmospheric Conditions
01 - Clear
02 - Rain
03 - Sleet or Hail
04 - Snow
05 - Fog, Smog, Smoke
06 - Severe Crosswinds
07 - Blowing Sand, Soil, Dirt
10 - Cloudy
11 - Blowing Snow
12 - Freezing Rain or Freezing Drizzle
98 - Other
99 - Unknown

LIGHT CONDITION ☐
01 - Daylight
02 - Dark-Not Lighted
03 - Dark-Lighted
04 - Dawn
05 - Dusk
06 - Dark-Unknown Lighting
98 - Other
99 - Unknown

ROADWAY SURFACE CONDITION ☐
00 - Non-Trafficway Area
01 - Dry
02 - Wet
03 - Snow
04 - Ice/Frost
05 - Sand
06 - Water (Standing, Moving)
07 - Oil
10 - Slush
11 - Mud, Dirt, Gravel
98 - Other
99 - Unknown

CONTRIBUTING CIRCUMSTANCE(S), ENVIRONMENT CONDITION(S) *(up to 3 choices)* ☐ ☐ ☐
00 - None
01 - Weather Conditions
02 - Visual Obstruction(s)
03 - Glare
04 - Animal(s) in Roadway
98 - Other
99 - Unknown

RELATION TO JUNCTION

WITHIN INTERCHANGE AREA ☐
00 - No 01 - Yes 99 - Unknown

SPECIFIC LOCATION ☐
01 - Non-Junction
02 - Intersection
03 - Intersection-Related
04 - Driveway Access
20 - Entrance/Exit Ramp
05 - Entrance/Exit Ramp Related
06 - Railway Grade Crossing
07 - Crossover-Related
08 - Driveway Access Related
16 - Shared-Use Path or Trail
17 - Acceleration/Deceleration Lane
18 - Through Roadway
98 - Other Location not Listed Above Within an Interchange Area (Median, Shoulder or Roadside)
99 - Unknown

INTERSECTION TYPE ☐
01 - Not at Intersection
02 - Four-Way Intersection
03 - T-Intersection
04 - Y-Intersection
05 - L-Intersection
06 - Roundabout
07 - Five-Point, or More
99 - Unknown

SCHOOL BUS RELATED ☐
00 - No
01 - Yes, School Bus Directly Involved
02 - Yes, School Bus Indirectly Involved
99 - Unknown

WORK ZONE ☐
00 - None
01 - Construction
02 - Maintenance
03 - Utility
04 - Work Zone, Type Unk

LOCATION OF THE CRASH ☐
01 - Before the First Work Zone Warning Sign
02 - Advance Warning Area
03 - Transition Area
04 - Activity Area
05 - Termination Area
97 - Not Applicable

TYPE OF WORK ZONE ☐
01 - Lane Closure
02 - Lane Shift/Crossover
03 - Work on Shoulder or Median
04 - Intermittent or Moving Work
97 - Not Applicable
98 - Other

WORKERS PRESENT ☐
00 - No 01 - Yes 97 - N/A 99 - Unk.

LAW ENFORCEMENT PRESENT ☐
00 - No
01 - Officer Present
02 - Law Enforcement Vehicle Only Present
97 - Not Applicable

** For person types go to the PERSON page*

12-200 Revised 04/04/2012

ALASKA MOTOR VEHICLE COLLISION REPORT

SR #: _____ INCIDENT/CASE # _____

CRASH DESCRIPTION

CRASH DIAGRAM

☐ Check if supplemental diagram

ALASKA MOTOR VEHICLE COLLISION REPORT

SR #: _____ INCIDENT/CASE # _____

MOTOR VEHICLE # [ ] **MOST CONTRIBUTING UNIT** [ ] 00 - No 01 - Yes **TOTAL NUMBER OF PEOPLE IN VEHICLE:** _____ *(page 1 of 2)*

MOTOR VEHICLE TYPE [ ]

01 - Motor Vehicle In-Transport (Inside or Outside the Trafficway)
- Within the roadway travel lanes (in motion or stopped)
- Anywhere within or outside the trafficway boundaries - in motion

02 - Motor Vehicle Stopped Inside the Trafficway Excluding Roadway
- Parked in designated curbside parking lane
- Parked in designated curbside parking lane with an open door crossing into the travel lane
- Stopped completely on the shoulder, median or roadside

03 - Motor Vehicle Stopped Outside the Trafficway
- Parked outside the trafficway
- Private construction - outside the trafficway

04 - Working Motor Vehicle (highway construction, maintenance, utility only)
- Active construction, maintenance or utility vehicles
- Law enforcement vehicle participating strictly in a stationary construction or mobile maintenance activity as a traffic slowing, control, signaling or calming influence

DRIVER PRESENCE [ ]
00 - No Driver Present
01 - Yes
97 - Not Applicable
99 - Unknown

VIN	LICENSE PLATE #	STATE	REG. YEAR	COLOR	MAKE

MODEL	MODEL YEAR	VEHICLE OWNER NAME (Last, First, Middle, Suffix)

MAILING ADDRESS	CITY	STATE	ZIP	CONTACT PHONE

BODY TYPE

Automobiles:
AM - Ambulance
BZ - Biohazard
CH - Coach
CV - Convertible
CP - Coupe
HT - Hardtop
2T - Hardtop, 2-door
4T - Hardtop, 4-door
HB - Hatchback/Fastback
2H - Hatchback, 2-door
4H - Hatchback, 4-door
HR - Hearse
LV - Law Enforcement
LM - Limousine
RH - Retractable Hardtop
RD - Roadster
SQ - Search and Rescue
SD - Sedan
2D - Sedan, 2-door Automobile
4D - Sedan, 4-door Automobile
SW - Station Wagon
TO - Touring Car

Construction Equipment:
AE - Aerial Platform
AI - Air Compressor
AD - Asphalt Distributor
BH - Backhoe
BK - Backhoe / Loader
BC - Brush Chipper
BG - Buggy, Concrete
BD - Bulldozer
CS - Construction Signal
CR - Crane
DR - Drill, Rock
EX - Excavator
FL - Forklift
GE - Generator
GD - Grader
HM - Hammer
HD - Hydraulic Dump
LF - Lift Boom
LT - Light Tower
LD - Loader
LK - Log Skidder
PV - Paver
PR - Prime Mover
RO - Roller
SZ - Saw
SC - Scraper
SH - Shovel
SO - Snowblower
SI - Striper
SS - Sweeper
TC - Tractor, Track-type
TF - Tractor, Wheel-type
TH - Trencher
VA - Vacuum Cleaner
WE - Welder
WS - Wood Splitter
CE - Unlisted Style of Contruction Equipment

Farm & Garden Equipment:
BH - Backhoe
BK - Backhoe / Loader
BC - Brush Chipper
BD - Bulldozer
CO - Combine
CI - Corn Picker
CK - Cotton Picker
CZ - Cotton Stripper
DE - Detasseling Equipment
FS - Fertilizer Spreader
FD - Field Chopper
FC - Flotation Chassis
FL - Fork Lift
GE - Generator
GD - Grader
HV - Harvester
HL - Hay Bale Loader
HY - Hay Baler
HD - Hydraulic Dump
LF - Lift Broom
LD - Loader
LK - Log Skidder
MO - Mower, Riding or Garden Tractor
MR - Mower-Conditioner
DI - Potato Digger
SC - Scraper
CO - Self-Propelled Combine
SY - Sprayer
SG - Stump Grinder
TC - Tractor, Track-type
TF - Tractor, Wheel-type
TA - Tree Harvester
TH - Trencher
UV - Utility Vehicle
WE - Welder
WN - Windrower
MF - Unlisted Style of Farm Equipment

Trailers:
AC - Auto Carrier
TD - Auto Tow Dolly
DY - Auxiliary Dolly
BZ - Biohazard
BT - Boat Trailer
BA - Bulk Agriculture
CL - Cable Reel
CT - Camping
CG - Converter Gear Trailer
SB - Cooking Trailer
DT - Dump Trailer
FB - Flatbed or Platform
GN - Grain Trailer
HO - Hopper
HE - Horse Trailer
HS - House Trailer
LV - Law Enforcement
LS - Livestock Rack
LB - Lowboy or Lowbed Trailer
MT - Motorcycle Trailer
PT - Passenger Tram or Trailer
LP - Pole Trailer
RF - Refrigerated Van
SQ - Search and Rescue
SE - Semi-Trailer
SR - Service Trailer
SP - Shipping Container
SM - Snowmobile Trailer
ST - Stake or Rack
TN - Tanker
TE - Tent Trailer
TD - Tow Dolly, Auto
CT- Travel Trailer
TV - Travel Trailer
UT - Utility Trailer
VN - Van, Van Trailer
GA - Wagon-Type Trailer

Motorcycles:
MK - Minibike
MY - Minicycle
MD - Moped
MB - Motorbike
MC - Motorcycle
MS - Motorscooter
MV - Multi-wheel

Terrain Vehicles: [ ]
EB - Enclosed Body, Removable Enclosure
EN - Enclosed Body, Nonremovable Enclosure
MV - Multi-wheel Vehicle
OP - Open Body

Trucks:
3D - 3-Door
4D - 4-Door
AM - Ambulance
AR - Armored Truck
BR - Beverage Rack
BZ - Biohazard
BA - Bulk Agriculture
BU - Bus
TM - Camper (Truck Mount)
LL - Carry-all
CB - Chassis and Cab
CM - Concrete or Transit Mixer
DP - Dump Truck
FT - Fire Truck
FB - Flatbed or Platform
FR - Flatrack Truck
GG - Garbage or Refuse
GN - Grain Truck
GR - Glass Rack
HO - Hopper (Bottom Dump)
LV - Law Enforcement
LF - Lift Boom
LS - Livestock Rack
LG - Log
LW - Lunch Wagon
MH - Motorized Home
PL - Pallet
PK - Pickup
PM - Pickup with Mounted Camper
RF - Refrigerated Van
SQ - Search and Rescue
ST - Stake or Rack
TN - Tanker
TT - Tow Truck / Wrecker
DS - Tractor Truck, Diesel
TR - Tractor Truck, Gasoline
VN - Van
VC - Van Camper
VT - Vanette
WD - Well Driller

Snowmobiles:
EB - Enclosed Body, Removable Enclosure
EN - Enclosed Body, Nonremovable Enclosure
OP - Open Body

SPECIAL FUNCTION [ ]
00 - No Special Function
01 - Taxi
02 - Vehicle Used as School Bus
03 - Vehicle Used as Other Bus
04 - Military
05 - Police
06 - Ambulance
07 - Fire Truck
08 - Emergency Services Vehicle
09 - Incident Response
99 - Unknown

EMERGENCY USE [ ]
01 - Non-Emergency, Non-Transport
02 - Non-Emergency, Transport
03 - Emergency Operation, Emergency Warning Equipment not in Use
04 - Emergency Operation, Emergency Warning Equipment in Use
97 - Not Applicable
99 - Unknown

POSTED SPEED LIMIT [ ] mph.

DIRECTION OF TRAVEL [ ]
00 - Northbound
01 - Southbound
02 - Eastbound
03 - Westbound
04 - Not on Roadway
99 - Unknown

TRAFFICWAY DESCRIPTION [ ]
00 - Non-Trafficway Area
01 - Two-Way, Not Divided
02 - Two-Way, Not Divided, With a Continuous Left Turn Lane
03 - Two-Way, Divided, Unprotected (Painted >4 Feet) Median
04 - Two-Way, Divided, Positive Median Barrier
06 - One-Way Trafficway
08 - Entrance/Exit Ramp
99 - Unknown

TOTAL THRU LANES [ ]
00 - Non-Trafficway Area
01 - One Lane
02 - Two Lanes
03 - Three Lanes
04 - Four Lanes
05 - Five Lanes
06 - Six Lanes
07 - Seven or More Lanes
99 - Unknown

ROADWAY ALIGNMENT AND GRADE

Horizontal Alignment: [ ]
00 - Non-Trafficway Area
01 - Straight
02 - Curve Right
03 - Curve Left
04 - Curve - Unk Direction
99 - Unknown

Grade: [ ]
00 - Non-Trafficway Area
01 - Level
02 - Grade, Unk Slope
03 - Hillcrest
04 - Sag (Bottom)
05- Uphill
06 - Downhill
99 - Unknown

TRAFFIC CONTROL DEVICE WORKING [ ]
00 - No Controls
01 - Device Not Functioning
02 - Device Functioning Improperly
03 - Device Functioning Properly
99 - Unknown

TRAFFIC CONTROL DEVICE TYPE [ ]
00 - No Controls
01 - Traffic Control Signal (on colors) without Pedestrian Signal
02 - Traffic Control Signal (on colors) with Pedestrian Signal
03 - Traffic Control Signal (on colors) not known whether or not Pedestrian Signal
04 - Flashing Traffic Control Signal
07 - Lane Use Control Signal
08 - Other Highway Traffic Signal
09 - Unknown Highway Traffic Signal
20 - Stop Sign
21 - Yield Sign
23 - School Zone Sign/Device
28 - Other Regulatory Sign
29 - Unk Regulatory Sign
40 - Warning Sign
50 - Person (flagger, law enforcement, crossing guard, etc.)
65 - Railway Crossing Device
98 - Other
99 - Unknown

VEHICLE MANEUVER / ACTION PRIOR TO RECOGNITION OF CRITICAL EVENT [ ]
00 - No Driver Present
01 - Going Straight
02 - Decelerating In Road
03 - Accelerating In Road
04 - Starting In Road
05 - Stopped In Road
06 - Passing Or Overtaking Another Vehicle
07 - Disabled Or "Parked" In Travel Lane
08 - Leaving A Parking Position
09 - Entering A Parking Position
10 - Turning Right
11 - Turning Left
12 - Making A U-Turn
13 - Backing Up (Other Than For Parking Position)
14 - Negotiating A Curve
15 - Changing Lanes
16 - Merging
17 - Successful Avoidance Maneuver To A Previous Critical Event
98 - Other: _____
99 - Unknown

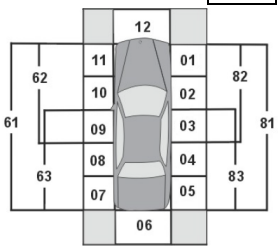
BUS USE [ ]
00 - Not a Bus
01 - School
04 - Intercity
05 - Charter/Tour
06 - Transit/Commuter
07 - Shuttle
08 - Modified for Personal/Private Use
98 - Other
99 - Unknown

ALASKA MOTOR VEHICLE COLLISION REPORT

SR #: _____ INCIDENT/CASE # _____

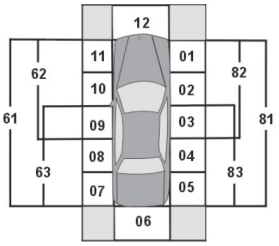
MOTOR VEHICLE # [ ] (cont.) *(page 2 of 2)*

INITIAL CONTACT POINT ON VEHICLE [ ]



00 - Non-Collision 15 - Cargo Loss
13 - Top 99 - Unknown
14 - Undercarriage

DAMAGED AREA(S) [ ] [ ]



00 - No Damage 98 - All Areas
13 - Top 99 - Unknown
14 - Undercarriage

UNDERCARRIAGE DAMAGE [ ]
00 - No 01 - Yes 99 - Unk.

DAMAGE > $501 [ ]
00 - No 01 - Yes 99 - Unk.

EXTENT OF DAMAGE [ ]
00 - No Damage
02 - Minor Damage 06 - Disabling Damage
04 - Functional Damage 99 - Unknown

VEHICLE REMOVAL [ ]
01 - Driven Away
02 - Towed Due to Disabling Damage
03 - Towed Not Due to Disabling Damage
04 - Abandoned/Left at Scene
99 - Unknown

TOWED BY
_____
_____

HIT AND RUN [ ]
00 - No, Did Not Leave Scene
01 - Yes, Driver or Car and Driver Left Scene
99 - Unknown

MOST HARMFUL EVENT *(this vehicle only)* [ ]

SEQUENCE OF EVENTS *(this vehicle only)*

1st [ ]
2nd [ ]
3rd [ ]
4th [ ]

Non-Collision Harmful Events:
01 - Rollover/Overturn
02 - Fire/Explosion
03 - Immersion, Full or Partial
04 - Gas Inhalation
05 - Fell/Jumped from Vehicle
06 - Injured in Vehicle (Non-Collision)
07 - Other Non-Collision
16 - Thrown or Falling Object
44 - Pavement Surface Irregularity (Ruts, Potholes, Grates, etc.)
51 - Jackknife (harmful to this vehicle)
72 - Cargo/Equipment Loss or Shift (harmful to this vehicle)

Collision with Motor Vehicle In-Transport:
12 - Motor Vehicle In-Transport
13 - Not-In-Motion or Working Motor Vehicle is Struck by Motor Vehicle In-Transport
54 - Motor Vehicle In-Transport Strikes or is Struck by Cargo, Persons or Objects Set-in-Motion from/by Another Motor Vehicle In-Transport
55 - Motor Vehicle In Motion Outside the Trafficway

Collision with Object Not Fixed:
08 - Pedestrian
09 - Pedalcyclist
10 - Railway Vehicle
11 - Live Animal: _____
14 - Parked Motor Vehicle
15 - Non-Motorist on Personal Conveyance
18 - Other Object (Not Fixed)
45 - Working Motor Vehicle
49 - Ridden Animal or Animal-Drawn Conveyance

Collision With Fixed Object:
17 - Boulder
19 - Building
20 - Impact Attenuator/Crash Cushion
21 - Bridge Pier or Support
23 - Bridge Rail (Includes Parapet)
50 - Bridge Overhead Structure
24 - Guardrail Face
52 - Guardrail End
25 - Concrete Traffic Barrier
57 - Cable Barrier
26 - Other Traffic Barrier
58 - Ground
59 - Traffic Sign Support
46 - Traffic Signal Support
30 - Utility Pole/Light Support
31 - Other Post, Other Pole or Other Supports
32 - Culvert
33 - Curb
34 - Ditch
35 - Embankment
38 - Fence
39 - Wall
40 - Fire Hydrant
41 - Shrubbery
42 - Tree (Standing Only)
48 - Snow Bank
53 - Mail Box
43 - Other Fixed Object
99 - Unknown

Non-Harmful Events: (For Sequence of Events Fields ONLY)
60 - Cargo/Equipment Loss or Shift (non-harmful)
61 - Equipment Failure (blown tire, (non-harmful) brake failure, etc.)
62 - Separation of Units
63 - Ran Off Roadway-Right
64 - Ran Off Roadway-Left
65 - Cross Median
66 - Downhill Runaway
67 - Vehicle Went Airborne
68 - Cross Centerline
69 - Re-entering Roadway
70 - Jackknife (non-harmful)
71 - Vehicle Set in Motion

VEHICLE CONTRIBUTING CIRCUMSTANCE(S) *(up to 2 choices)* [ ] [ ]
00 - None
01 - Tires
02 - Brake System
03 - Steering
04 - Suspension
05 - Power Train
06 - Exhaust System
07 - Head Lights
08 - Signal Lights
09 - Other Lights
10 - Wipers
11 - Wheels
12 - Mirrors
13 - Windows / Windshield
14 - Body, Doors
15 - Truck Coupling / Trailer Hitch / Safety Chains
16 - Safety Systems
98 - Other
99 - Unknown

HEADLIGHTS ON [ ]
00 - No 01 - Yes 99 - Unk.

CONTRIBUTING CIRCUMSTANCE(S), ROAD *(up to 3 choices)* [ ] [ ] [ ]
00 - None
01 - Backup Due to Prior Crash
02 - Backup Due to Prior Non-Recurring Incident
03 - Backup Due to Regular Congestion
04 - Toll Plaza Related
05 - Road Surface Condition (wet, icy, snow, slush, etc.)
06 - Debris
07 - Rut, Holes, Bumps
08 - Work Zone (construction / maintenance / utility)
09 - Worn, Travel-Polished Surface
10 - Obstruction in Roadway
11 - Traffic Control Device Inoperative, Missing, or Obscured
12 - Shoulders (none, low, soft, high)
13 - Non-Highway Work
98 - Other
99 - Unknown

CARRIER
(If this crash involves a carrier, forward a copy of the report to: Commercial Vehicle Operations, 11900 Industry Way, Anchorage, AK 99515)

MOTOR CARRIER TYPE [ ]
01 - Interstate Carrier
02 - Intrastate Carrier
03 - Not in Commerce/Government
04 - Not in Commerce/Other Truck (Over 10,000 lbs. GVWR/GCWR)
97 - Not Applicable

IDENTIFICATION # [ ]
00 - None
01 - Identification # _____
97 - Not Applicable
99 - Unknown

ISSUING AUTHORITY [ ]
00 - None
01 - State _____
02 - US DOT
03 - MC/MX
04 - Canada
05 - Mexico
97 - Not Applicable
99 - Unknown

CARRIER NAME SOURCE [ ]
00 - None
01 - Driver/Vehicle
02 - Log Book
03 - Shipping Papers
04 - Trip Manifest
97 - Not Applicable

CARRIER NAME
_____

ADDRESS
_____

CITY _____ **STATE** _____

ZIP _____ **COUNTRY** _____ **PHONE** _____

GVWR / GCWR [ ]
01 - 10,000 lbs. or less
02 - 10,001 lbs. - 26,000 lbs.
03 - 26,001 lbs. or more
97 - Not Applicable
99 - Unknown

VEHICLE CONFIGURATION [ ]
01 - Single-Unit Truck (2-axle and GVWR > 10,000 lbs.)
02 - Single-Unit Truck (3 or more Axles)
04 - Truck Pulling Trailer
05 - Truck Tractor (Bobtail or Saddlemount, without Trailer)
06 - Truck Tractor/Semi-Trailer (One Trailer)
07 - Truck Tractor/Double (Two Trailers)
08 - Truck Tractor/Triple (Three Trailers)
10 - Passenger Car (Only If Vehicle Has HM Placard)
11 - Light Truck (Only If Vehicle Has HM Placard)
19 - Truck More Than 10,000 lbs., Cannot Classify
20 - Bus/Large Van (Seats for 9-15 People, Including Driver)
21 - Bus (Seats for 16 People or More, Including Driver)
97 - Not Applicable
98 - Other
99 - Unknown

CARGO BODY TYPE(S) *(up to 2 choices)* [ ] [ ]
01 - Van/Enclosed Box
02 - Cargo Tank
03 - Flatbed
04 - Dump
05 - Concrete Mixer
06 - Auto Transporter
07 - Garbage/Refuse
08 - Grain/Chips/Gravel
09 - Pole Trailer
10 - Logging
11 - Intermodal Container Chassis
12 - Vehicle Towing Another Vehicle
22 - Bus (Seats for 9-15 People, Including Driver)
23 - Bus (Seats for 16 People or More, Including Driver)
96 - No Cargo Body - (Bobtail, Light Motor Vehicle with Hazardous Materials [HM] Placard, etc.)
97 - Not Applicable - (Motor Vehicle 10,000 lbs. or Less not Displaying HM Placard)
98 - Other
99 - Unknown

HAZARDOUS MATERIALS (Cargo Only)

Involvement [ ]
00 - No 01 - Yes

Placard Displayed [ ]
00 - No 01 - Yes
97 - Not Applicable

HM 4-Digit # [ ]
or name from diamond or box

HM Class # [ ]
from bottom of diamond

Was Haz Mat Released from this Vehicle's Cargo? [ ]
00 - No 01 - Yes 97 - Not Applicable

ALASKA MOTOR VEHICLE COLLISION REPORT

SR #: _____ INCIDENT/CASE # _____

PERSON # [ ] **MOTOR VEHICLE #** *(for person types 01, 02, 03 & 09)* [ ] **MOST CONTRIBUTING UNIT** 00 - No 01 - Yes [ ] *(page 1 of 2)*

PERSON TYPE [ ]

MOTORISTS
01 - Driver of a Motor Vehicle In-Transport
02 - Passenger of a Motor Vehicle In-Transport
09 - Unknown Person Type in a Motor Vehicle In-Transport

NON - MOTORISTS
03 - Occupant of a Motor Vehicle Not In-Transport
04 - Occupant of a Non-Motor Vehicle Transport Device
05 - Pedestrian
06 - Bicyclist
07 - Other Cyclist
08 - Person on Personal Conveyance
10 - Person In/On Building
19 - Unknown Type of Non-Motorist

FULL NAME (Last, First, Middle, Suffix)	SEX 01 - Male 02 - Female 99 - Unknown [ ]

MAILING ADDRESS	CITY	STATE	ZIP

PHYSICAL ADDRESS	CITY	STATE	ZIP

CONTACT PHONE	DOB	OL / DL #	STATE	APSIN ID #

INJURY STATUS [ ]
00 - No Apparent Injury
01 - Possible Injury
02 - Suspected Minor Injury
03 - Suspected Serious Injury
04 - Fatal Injury (Killed)
06 - Died Prior to Crash
99 - Unknown

SOURCE OF TRANSPORT TO FIRST MEDICAL FACILITY [ ]
00 - Not Transported
01 - EMS Air
02 - Law Enforcement
03 - EMS Unk. Mode
04 - Transported Unk. Source
05 - EMS Ground
98 - Other
99 - Unknown

EMS VEHICLE AGENCY ID _____

EMS RUN # _____

NAME OF MEDICAL FACILITY

CONTRIBUTING ACTION(S) / CIRCUMSTANCE(S) AT TIME OF CRASH *(up to 4 choices)* [ ] [ ] [ ] [ ]

00 - No Contributing Action / Circumstance
01 - Ran Off Roadway
02 - Failed to Yield Right-of-Way
03 - Ran Red Light
04 - Ran Stop Sign
05 - Failure to Obey Other Traffic Signs, Signals, Officer etc.
06 - Failure to Signal Intentions
07 - Disregarded Other Road Markings
08 - Improper Turn
09 - Improper Merge
10 - Improper Backing
11 - Improper Passing
12 - Passing with Insufficient Distance or Inadequate Visibility
13 - Failure to Yield to Overtaking Vehicle
14 - Improper or Erratic Lane Changing
15 - Making Improper Entry to or Exit from Trafficway
16 - Wrong Side or Wrong Way
17 - Followed Too Closely
18 - Failed to Keep in Proper Lane
19 - Operated Motor Vehicle in an Inattentive, Careless, Erratic, or Negligent Manner
20 - Operated Motor Vehicle in a Reckless or Aggressive Manner
21 - Swerved or Avoided Due to Wind, Slippery Surface, Motor Vehicle, Object, Non-Motorist in Roadway, etc.
22 - Over-Correcting / Over-Steering
23 - Reaction to or Failure to Take Drugs / Medication
24 - Unlawful Driving on Sidewalk or Pathway
25 - Improper / Unsecure Load (with Passengers or Cargo)
26 - Towing or Pushing Improperly
27 - Operating Without Required Equipment
28 - Interfering with Driver
29 - Construction / Maintenance / Utility Worker
30 - Operator Inexperience
31 - Pedestrian Error / Confusion
32 - Emergency Services Personnel
33 - Police or Law Enforcement Officer
34 - Police Pursuing this Driver
35 - Police Officer in Pursuit
36 - Dart / Dash
37 - In Roadway Improperly (Standing, Lying, Working, Playing)
38 - Disabled Vehicle Related (Working on, Pushing, Leaving / Approaching)
39 - Entering / Exiting Vehicle
40 - Improper Crossing of Roadway or Intersection (Jaywalking)
41 - Not Visible (Dark Clothing, No Lighting, etc.)
42 - Set Vehicle in Motion
98 - Other Contributing Action / Circumstance
99 - Unknown

SPEEDING SUSPECTED [ ]
00 - No
01 - Racing
02 - Exceeded Speed Limit
03 - Too Fast for Conditions
97 - Not Applicable
99 - Unknown

VISUAL OBSTRUCTION [ ]
00 - None
01 - Interior
02 - Exterior
97 - Not Applicable

RESTRAINT SYSTEM / SAFETY EQUIPMENT(S) *(up to 4 choices)* [ ] [ ] [ ] [ ]

01 - Shoulder Belt Only Used
02 - Lap Belt Only Used
03 - Shoulder and Lap Belt Used
04 - Child Restraint System – Forward Facing
05 - Child Restraint System – Rear Facing
06 - Child Restraint Type Unknown
07 - Booster Seat
08 - Restraint Used – Type Unknown
09 - Reflective Equipment / Clothing (Jacket, Backpack, etc.)
10 - Protective Clothing / Pads (Elbows, Knees, Shins, etc.)
11 - Lighting
12 - DOT-Compliant Motorcycle Helmet
13 - Helmet, Other than DOT-Compliant Motorcycle Helmet
14 - Helmet, Unknown if DOT-Compliant Motorcycle Helmet
15 - No Helmet
16 - No Restraint System Used
17 - No Safety Equipment Used
96 - Other Restraint System
97 - Other Safety Equipment
98 - Unknown if Helmet Worn
99 - Unknown if Used

MIS-USE [ ]
00 - No
01 - Yes

DISTRACTED BY [ ]
00 - Not Distracted
01 - Manually Operating an Electronic Communication Device (Texting, Typing, Dialing)
02 - Talking on Hand-Free Electronic Device
03 - Talking on Hand-Held Electronic Device
04 - Other Activity, Electronic Device (Navigation Device, DVD Player, etc.)
05 - Passenger
06 - Other Inside the Vehicle (Eating, Personal Hygiene, etc.)
07 - Outside the Vehicle (Includes Unspecified External Distractions)
97 - Not Applicable
99 - Unknown if Distracted

CONDITION(S) AT TIME OF CRASH *(up to 2 choices)* [ ] [ ]
00 - None/Apparently Normal
01 - Ill, Blackout
02 - Asleep or Fatigued
03 - Walking with a Cane or Crutches
04 - Paraplegic Or Restricted to Wheelchair
05 - Impaired Due To Previous Injury
06 - Deaf
07 - Blind
08 - Emotional (depressed, angry, disturbed, etc)
09 - Under the Influence of Alcohol, Drugs or Medication
10 - Physical Impairment
98 - Other
99 - Unknown If Impaired

ALCOHOL SUSPECTED [ ]
00 - No
01 - Yes
99 - Unknown

ALCOHOL TEST STATUS [ ]
00 - Test Not Given
01 - Test Refused
02 - Test Given
99 - Unknown if Tested

ALCOHOL TEST TYPE [ ]
00 - Test Not Given
01 - Blood "BAC"
02 - Breathalyzer "BrAC"
04 - Vitreous
05 - Blood Plasma/Serum
10 - Preliminary Breath Test (PBT)
97 - Other Test Type
98 - Unknown Test Type
99 - Unknown if Tested

ALCOHOL TEST RESULT [ ]
00 - Test Not Given
01 - Test Given - Reading Value: _____
99 - Unknown if Tested

ALASKA MOTOR VEHICLE COLLISION REPORT

SR #: _____ INCIDENT/CASE # _____

PERSON # [ ] **(cont.)** *(page 2 of 2)*

DRUGS SUSPECTED [ ]
00 - No
01 - Yes
99 - Unknown

DRUG TEST STATUS [ ]
00 - Test Not Given
01 - Test Refused
02 - Test Given
99 - Unknown if Tested

DRUG TEST TYPE [ ]
00 - Test Not Given
01 - Blood
02 - Urine
03 - Both: Blood and Urine Tests
07 - Unknown Test Type
98 - Other Test Type
99 - Unknown if Tested

DRUG TEST RESULT [ ]
00 - Test Not Given
01 - Positive
02 - Negative
99 - Unknown

DRUG(S) DETECTED *(up to 4 choices)* [ ] [ ] [ ] [ ]
01 - Marijuana
02 - Cocaine
03 - Opiate
04 - Amphetamine
05 - PCP
06 - Other Controlled Substance
07 - Other Drug (Excludes Post-Crash Drugs)
97 - Not Applicable

CHARGE(S) [ ]
00 - No Charges
01 - Yes
Total charges for this person: _____
99 - Unknown

Fill these only for person type 01 (DRIVERS only)

CDL [ ]
00 - No
01 - Yes
97 - Not a Driver
99 - Unknown

DL CLASS(ES) *(up to 2 choices)* [ ] [ ]
Enter 00 for Not Licensed
97 for Not a Driver
99 for Unknown

NON-CDL STATUS [ ]
00 - Not Licensed or CDL
01 - Suspended
02 - Revoked
03 - Expired
04 - Canceled or Denied
06 - Valid
07 - Limited
08 - Temporary
97 - Not a Driver
99 - Unknown

CDL STATUS [ ]
00 - Not Licensed or Not a CDL
01 - Suspended
02 - Revoked
03 - Expired
04 - Canceled or Denied
05 - Disqualified
06 - Valid
07 - Learner's Permit
08 - Other - Not Valid
09 - Temporary
97 - Not a Driver
99 - Unknown

LICENSE COMPLIANCE WITH CLASS OF VEHICLE [ ]
00 - Not licensed
01 - No license required for this class vehicle
02 - No valid license for this class vehicle
03 - Valid license for this class vehicle
08 - Unknown if CDL and/or CDL endorsement required for this vehicle
97 - Not a Driver
99 - Unknown

DL ENDORSEMENT(S) *(up to 5)* [ ] [ ] [ ] [ ] [ ]
Enter: 00 for None or Not Licensed 97 for Not a Driver 99 for Unknown

COMPLIANCE WITH CDL ENDORSEMENT(S) [ ]
00 - No Endorsements Required for the Vehicle
01 - Endorsement(s), Complied With
02 - Endorsement(s), Not Complied With
03 - Endorsement(s), Compliance Unk.
97 - Not a Driver
99 - Unknown, if Required

DRIVER LICENSE RESTRICTION(S) *(up to 3 choices)* [ ] [ ] [ ]
Enter: 0 for None or Not Licensed 97 for Not a Driver 99 for Unk.

COMPLIANCE WITH DRIVER'S LICENSE RESTRICTION(S) [ ]
00 - No Restrictions
01 - Restrictions Complied With
02 - Restrictions Not Complied With
03 - Restrictions, Compliance Unknown
97 - Not a Driver
99 - Unknown

INSURANCE COVERAGE [ ]
00 - No 01 - Yes 97 - Not a Driver 99 - Unk.

INSURANCE COMPANY _____

INSURANCE POLICY # _____

NFR [ ]
00 - No 01 - Yes

Fill these only for person types 01, 02, 03, 04 and 09

ROW [ ]
01 - Front
02 - Second
03 - Third
04 - Fourth
05 - Other Row (Bus, 15 Passenger Van, etc.)
97 - Not Applicable
99 - Unknown

SEAT [ ]
01 - Left
02 - Middle
03 - Right
97 - Not Applicable
98 - Other
99 - Unknown

OTHER LOCATION [ ]
00 - No Other Location
01 - Sleeper Section of Cab (Truck)
02 - Other Enclosed Cargo Area
03 - Unenclosed Cargo Area
04 - Trailing Unit
05 - Riding on Motor Vehicle Exterior (Non-Trailing Unit)
97 - Not Applicable
99 - Unknown

AIRBAG DEPLOYED [ ]
00 - Not Deployed
01 - No Airbags Available
02 - Deployed – Front
03 - Deployed – Side (Door, Seatback)
04 - Deployed – Curtain (Roof)
07 - Deployed – Other (Knee, Air Belt, etc.)
08 - Deployed – Combination
09 - Deployment – Unk. Location
28 - Switched Off
97 - Not Applicable
99 - Deployment Unknown

EJECTION [ ]
00 - Not Ejected
01 - Totally Ejected
02 - Partially Ejected
97 - Not Applicable
99 - Unknown if Ejected

EJECTION PATH [ ]
00 - Not Ejected
01 - Through Side Door Opening
02 - Through Side Window
03 - Through Windshield
04 - Through Back Window
05 - Through Back Door / Tailgate Opening
06 - Through Roof Opening (Sun-Roof, Convertible Top Down)
07 - Through Roof (Convertible Top Up)
97 - Not Applicable
98 - Other Path (e.g. Back of Pick-Up Truck)
99 - Unknown / Unknown Path

EXTRICATION [ ]
00 - Not Extricated 01 - Extricated 97 - Not Applicable 99 - Unknown

Fill these only for person types 04, 05, 06, 07, 08, 10 and 19

COLLISION WITH MOTOR VEHICLE UNIT # [ ]

DIRECTION OF TRAVEL [ ]
00 - Northbound
01 - Southbound
02 - Eastbound
03 - Westbound
04 - Not on Roadway
97 - Not Applicable
99 - Unknown

ACTION(S) / CIRCUMSTANCE(S) PRIOR TO CRASH *(up to 2 choices)* [ ] [ ]
00 - None
01 - Waiting to Cross Roadway
02 - Crossing Roadway
03 - Jogging/Running
04 - Movement Along Roadway with Traffic (In or Adjacent to Travel Lane)
05 - Movement Along Roadway Against Traffic (In or Adjacent to Travel Lane)
06 - Movement on Sidewalk
07 - In Roadway - Other
08 - Adjacent to Roadway (e.g., Shoulder, Median)
09 - Working in Trafficway (Incident Response)
10 - Entering/Exiting a Vehicle
11 - Disabled Vehicle Related (Working on, Pushing, Leaving/Approaching)
97 - Not Applicable
98 - Other
99 - Unknown

TRAFFIC CONTROL DEVICE TYPE [ ]
00 - No Controls
01 - Traffic Control Signal (On Colors) without Pedestrian Signal
02 - Traffic Control Signal (On Colors) with Pedestrian Signal
03 - Traffic Control Signal (On Colors) not Known Whether or not Pedestrian Signal
04 - Flashing Traffic Control Signal
07 - Lane Use Control Signal
08 - Other Highway Traffic Signal
09 - Unknown Highway Traffic Signal
20 - Stop Sign
21 - Yield Sign
23 - School Zone Sign/Device
28 - Other Regulatory Sign
29 - Unk Regulatory Sign
40 - Warning Sign
50 - Person (Flagger, Law Enforcement, Crossing Guard, etc.)
65 - Railway Crossing Device
97 - Not Applicable
98 - Other
99 - Unknown

GOING TO OR FROM SCHOOL (K-12) [ ]
00 - No 01 - Yes 97 - Not Applicable 99 - Unknown

LOCATION AT TIME OF CRASH [ ]
01 - Intersection - In Marked Crosswalk
02 - Intersection - Unmarked Crosswalk
03 - Intersection - Not In Crosswalk
09 - Intersection - Unknown Location
10 - Non-Intersection - In Marked Crosswalk
11 - Non-Intersection - On Roadway, Not in Available Marked Crosswalk
12 - Non-Intersection - On Roadway, Marked Crosswalk Unavailable
13 - Non-Intersection - On Roadway, Crosswalk Availability Unknown
14 - Parking Lane / Zone
16 - Bicycle Lane
20 - Shoulder/Roadside
21 - Sidewalk
22 - Median/Crossing Island
23 - Driveway Access
24 - Shared-Use Path/Trail
25 - Non-Trafficway Area
96 - Travel Lane - Other Location
97 - Not Applicable
98 - Other
99 - Unknown Location

ALASKA MOTOR VEHICLE COLLISION REPORT

SR #: ____________ INCIDENT/CASE # ____________

CHARGES FOR THIS CRASH

PERSON # ____ CITATION NUMBER ____________ CHARGE (STATUTE OR ORDINANCE CITE) ____________
CITATION ISSUED ☐
CHARGE DESCRIPTION ____________

PERSON # ____ CITATION NUMBER ____________ CHARGE (STATUTE OR ORDINANCE CITE) ____________
CITATION ISSUED ☐
CHARGE DESCRIPTION ____________

PERSON # ____ CITATION NUMBER ____________ CHARGE (STATUTE OR ORDINANCE CITE) ____________
CITATION ISSUED ☐
CHARGE DESCRIPTION ____________

PERSON # ____ CITATION NUMBER ____________ CHARGE (STATUTE OR ORDINANCE CITE) ____________
CITATION ISSUED ☐
CHARGE DESCRIPTION ____________

PERSON # ____ CITATION NUMBER ____________ CHARGE (STATUTE OR ORDINANCE CITE) ____________
CITATION ISSUED ☐
CHARGE DESCRIPTION ____________

PERSON # ____ CITATION NUMBER ____________ CHARGE (STATUTE OR ORDINANCE CITE) ____________
CITATION ISSUED ☐
CHARGE DESCRIPTION ____________

PERSON # ____ CITATION NUMBER ____________ CHARGE (STATUTE OR ORDINANCE CITE) ____________
CITATION ISSUED ☐
CHARGE DESCRIPTION ____________

PERSON # ____ CITATION NUMBER ____________ CHARGE (STATUTE OR ORDINANCE CITE) ____________
CITATION ISSUED ☐
CHARGE DESCRIPTION ____________

PERSON # ____ CITATION NUMBER ____________ CHARGE (STATUTE OR ORDINANCE CITE) ____________
CITATION ISSUED ☐
CHARGE DESCRIPTION ____________

PERSON # ____ CITATION NUMBER ____________ CHARGE (STATUTE OR ORDINANCE CITE) ____________
CITATION ISSUED ☐
CHARGE DESCRIPTION ____________

ALASKA MOTOR VEHICLE COLLISION REPORT

SR #: ____________ INCIDENT/CASE # ____________

WITNESSES TO THIS CRASH

FULL NAME (Last, First, Middle, Suffix) ____ SEX 01 - Male 02 - Female 99 - Unk. ☐ OL / DL # ____ STATE ____
DOB ____ PHYSICAL ADDRESS ____ CITY ____ STATE ____ ZIP ____ CONTACT PHONE ____ APSIN ID # ____

FULL NAME (Last, First, Middle, Suffix) ____ SEX 01 - Male 02 - Female 99 - Unk. ☐ OL / DL # ____ STATE ____
DOB ____ PHYSICAL ADDRESS ____ CITY ____ STATE ____ ZIP ____ CONTACT PHONE ____ APSIN ID # ____

FULL NAME (Last, First, Middle, Suffix) ____ SEX 01 - Male 02 - Female 99 - Unk. ☐ OL / DL # ____ STATE ____
DOB ____ PHYSICAL ADDRESS ____ CITY ____ STATE ____ ZIP ____ CONTACT PHONE ____ APSIN ID # ____

FULL NAME (Last, First, Middle, Suffix) ____ SEX 01 - Male 02 - Female 99 - Unk. ☐ OL / DL # ____ STATE ____
DOB ____ PHYSICAL ADDRESS ____ CITY ____ STATE ____ ZIP ____ CONTACT PHONE ____ APSIN ID # ____

FULL NAME (Last, First, Middle, Suffix) ____ SEX 01 - Male 02 - Female 99 - Unk. ☐ OL / DL # ____ STATE ____
DOB ____ PHYSICAL ADDRESS ____ CITY ____ STATE ____ ZIP ____ CONTACT PHONE ____ APSIN ID # ____

FULL NAME (Last, First, Middle, Suffix) ____ SEX 01 - Male 02 - Female 99 - Unk. ☐ OL / DL # ____ STATE ____
DOB ____ PHYSICAL ADDRESS ____ CITY ____ STATE ____ ZIP ____ CONTACT PHONE ____ APSIN ID # ____

FULL NAME (Last, First, Middle, Suffix) ____ SEX 01 - Male 02 - Female 99 - Unk. ☐ OL / DL # ____ STATE ____
DOB ____ PHYSICAL ADDRESS ____ CITY ____ STATE ____ ZIP ____ CONTACT PHONE ____ APSIN ID # ____

FULL NAME (Last, First, Middle, Suffix) ____ SEX 01 - Male 02 - Female 99 - Unk. ☐ OL / DL # ____ STATE ____
DOB ____ PHYSICAL ADDRESS ____ CITY ____ STATE ____ ZIP ____ CONTACT PHONE ____ APSIN ID # ____

FULL NAME (Last, First, Middle, Suffix) ____ SEX 01 - Male 02 - Female 99 - Unk. ☐ OL / DL # ____ STATE ____
DOB ____ PHYSICAL ADDRESS ____ CITY ____ STATE ____ ZIP ____ CONTACT PHONE ____ APSIN ID # ____

FULL NAME (Last, First, Middle, Suffix) ____ SEX 01 - Male 02 - Female 99 - Unk. ☐ OL / DL # ____ STATE ____
DOB ____ PHYSICAL ADDRESS ____ CITY ____ STATE ____ ZIP ____ CONTACT PHONE ____ APSIN ID # ____

FULL NAME (Last, First, Middle, Suffix) ____ SEX 01 - Male 02 - Female 99 - Unk. ☐ OL / DL # ____ STATE ____
DOB ____ PHYSICAL ADDRESS ____ CITY ____ STATE ____ ZIP ____ CONTACT PHONE ____ APSIN ID # ____

FULL NAME (Last, First, Middle, Suffix) ____ SEX 01 - Male 02 - Female 99 - Unk. ☐ OL / DL # ____ STATE ____
DOB ____ PHYSICAL ADDRESS ____ CITY ____ STATE ____ ZIP ____ CONTACT PHONE ____ APSIN ID # ____

12-200 Revised 04/04/2012

ALASKA MOTOR VEHICLE CRASH FORM 12-209

SR #

CRASH INFORMATION

(One choice per field unless otherwise noted. Other* should be explained in narrative)

Total # Vehicles | Crash Date | Time of Crash ○ am ○ pm | Crash Day ○ 01 MON ○ 02 TUE ○ 03 WED ○ 04 THU ○ 05 FRI ○ 06 SAT ○ 07 SUN | Crash occurred in (City / Borough)

Name of Street or Highway | _____ ○ Miles _____ ○ Feet | ○ North of: ○ East of: ○ South of: ○ West of: ○ At intersection with: | Name of Cross Street, Highway, Bridge, etc.

OFFICIAL USE ONLY ~~Location Control~~ ~~Reference Point~~

Weather
- ○ 01 Blowing dirt, snow
- ○ 02 Clear
- ○ 03 Cloudy
- ○ 04 Fog/ smoke
- ○ 05 Ice fog
- ○ 06 Rain
- ○ 07 Sleet, hail (freezing rain)
- ○ 08 Severe crosswinds
- ○ 09 Snow
- ○ 10 Other*
- ○ 11 Not reported
- ○ 12 Unknown

Lighting
- ○ 01 Dark - lighted roadway
- ○ 02 Dark - not lighted
- ○ 03 Dark - unknown lighting
- ○ 04 Daylight
- ○ 05 Twilight
- ○ 06 Other*
- ○ 07 Not reported
- ○ 08 Unknown

Roadway / Junction
- ○ 01 Crossover
- ○ 02 Driveway
- ○ 03 Not a junction
- ○ 04 On ramp
- ○ 05 Off ramp
- ○ 06 Railway crossing
- ○ 07 Roundabout
- ○ 08 T - intersection
- ○ 09 Y - intersection
- ○ 10 Four way intersection
- ○ 11 Five point or more
- ○ 12 Unknown
- ○ 13 Other*

First Sequence of Events (what was the first thing you crashed into, or what was the first event that resulted in the crash. (CHECK ONLY ONE FOR EITHER COLLISION OR NON-COLLISION

COLLISION
- ○ 01 Aircraft
- ○ 02 Animal
- ○ 03 Bicyclist
- ○ 04 Bridge / overpass
- ○ 05 Bridge rail
- ○ 06 Crash cushion
- ○ 07 Culvert
- ○ 08 Curb / wall
- ○ 09 Ditch
- ○ 10 Embankment
- ○ 11 Fence
- ○ 12 Guard rail face
- ○ 13 Guard rail end
- ○ 14 Light support
- ○ 15 Machinery
- ○ 16 Mail box
- ○ 17 Median barrier
- ○ 18 Moose
- ○ 19 Parked vehicle
- ○ 20 Pedestrian
- ○ 21 Sideswipe
- ○ 22 Sign
- ○ 23 Snowberm
- ○ 24 Traffic signal pole
- ○ 25 Train
- ○ 26 Tree / shrub
- ○ 27 Utility pole
- ○ 28 Vehicle in transit
- ○ 29 Vehicle - rear end
- ○ 30 Vehicle - head on
- ○ 31 Vehicle - angle
- ○ 32 Other fixed object

NON-COLLISION
- ○ 33 Cargo loss / shift
- ○ 34 Crossed median / centerline
- ○ 35 Downhill runaway
- ○ 36 Equipment failure
- ○ 37 Explosion / fire
- ○ 38 Immersion
- ○ 39 Jackknife
- ○ 40 Overturn
- ○ 41 Ran off road
- ○ 42 Separation of units
- ○ 43 Other*
- ○ 44 Unknown

Location of First Sequence of Events (where did the crash happen first?)
- ○ 01 Bike lane
- ○ 02 Gore
- ○ 03 Median
- ○ 04 Outside of trafficway
- ○ 05 Parking lot
- ○ 06 Roadside
- ○ 07 Roadway
- ○ 08 Shared use paths
- ○ 09 Shoulder
- ○ 10 Unknown

Road Surface
- ○ 01 Dry
- ○ 02 Ice
- ○ 03 Water
- ○ 04 Sand, mud, oil
- ○ 05 Slush
- ○ 06 Snow
- ○ 07 Wet
- ○ 08 Other*

Did police investigate this crash? ○ Yes ○ No

YOUR DRIVER INFORMATION

Your Name (Vehicle Driver's Last Name, First Name, Middle Name) | Your Date of Birth | Your Contact Telephone

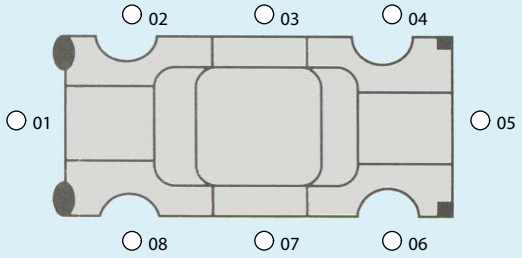
Your Mailing Address | Your Driver License Number | Your Driver License State | Your Driver License Country

Your City | Your State | Your Zip Code | Your Residence Country

YOUR VEHICLE INFORMATION

Your Vehicle Damage | No. of Occupants

- ○ 01 None / minor
- ○ 02 Functional
- ○ 03 Disabling
- ○ 04 Totaled
- ○ 05 Unknown



CHECK ONLY ONE TO SHOW FIRST AREA OF IMPACT

Your Vehicle Owner's Name (Last, First, Middle Initial) | Vehicle Owner's Telephone

Your Vehicle Owner's Mailing Address

Your Vehicle Owner's City | Your Vehicle Owner's State | Vehicle Owner's Zip Code

Vehicle Year | Vehicle Make | Vehicle Model | License Plate # | Vehicle License State

Your Vehicle's Direction of Travel
- ○ 01 North
- ○ 02 South
- ○ 03 East
- ○ 04 West
- ○ 05 Unknown

Damage Estimate ○ Over $501

Your Vehicle Driver's Injury Status (vehicle passengers are listed on page 2)
- ○ 01 Fatal
- ○ 02 Incapacitating
- ○ 03 Non-incapacitating
- ○ 04 Possible
- ○ 05 None
- ○ 06 Not reported
- ○ 07 Unknown

Roadway Circumstances (that may have contributed to the crash)
- ○ 01 Debris
- ○ 02 Inoperative traffic device
- ○ 03 Missing traffic device
- ○ 04 Obscured traffic device
- ○ 05 Obstruction in roadway
- ○ 06 Shoulder
- ○ 07 Road surface condition
- ○ 08 Ruts, holes, bumps
- ○ 09 School zone
- ○ 10 Work zone
- ○ 11 Worn, polished road surface
- ○ 12 None
- ○ 13 Other*
- ○ 14 Unknown

Your Vehicle Action
- ○ 01 Avoiding objects in road
- ○ 02 Backing
- ○ 03 Changing lanes
- ○ 04 Entering traffic lane
- ○ 05 Leaving traffic lane
- ○ 06 Making U-turn
- ○ 07 Merging
- ○ 08 Out of control
- ○ 09 Passing
- ○ 10 Parked
- ○ 11 Skidding
- ○ 12 Slowing
- ○ 13 Starting in traffic
- ○ 14 Stopped
- ○ 15 Straight ahead
- ○ 16 Turning right
- ○ 17 Turning left
- ○ 18 Other*
- ○ 19 Unknown

Traffic Control
- ○ 01 Flashing signal
- ○ 02 No traffic controls
- ○ 03 Road construction signs
- ○ 04 RR crossing device
- ○ 05 School zone signs
- ○ 06 Stop sign
- ○ 07 Traffic control signal
- ○ 08 Warning signs
- ○ 09 Officer / Flagman / Guard
- ○ 10 Yield sign
- ○ 11 Other*
- ○ 12 Unknown

Vehicle Configuration
- ○ 01 Dog sled
- ○ 02 Light truck (4 tires)
- ○ 03 Motorhome
- ○ 04 Motorcycle
- ○ 05 Off highway vehicle
- ○ 06 Passenger car
- ○ 07 Pedalcycle
- ○ 08 Pedestrian
- ○ 09 Other*
- ○ 10 Unknown

CRASH DESCRIPTION (Write a brief narrative describing the crash)

ALASKA MOTOR VEHICLE CRASH FORM 12-209

OTHER DRIVER'S INFORMATION

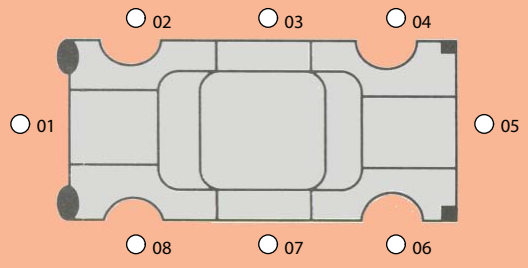
Other Driver's Name (Last Name, First Name, Middle Name)		Other Driver's Date of Birth	Other Driver's Contact Telephone
Other Driver's Mailing Address	Other Driver's License #	Other Driver's License State	Other Driver's License Country
Other Driver's Mailing Address City	Other Driver's State	Other Driver's Zip Code	Other Driver's Residence Country

OTHER DRIVER VEHICLE INFORMATION

Other Vehicle Damage

Other Vehicle No. of Occupants

○ 01 None / minor ○ 03 Disabling ○ 05 Unknown
○ 02 Functional ○ 04 Totaled



CHECK ONLY ONE TO SHOW FIRST AREA OF IMPACT

Other Vehicle Owner's Name (Last, First, Middle Initial)		Other Vehicle Owner's Telephone
Other Vehicle Owner's Mailing Address		
Other Vehicle Owner's City	Other Vehicle Owner's State	Other Vehicle Owner's Zip

Vehicle Year	Vehicle Make	Vehicle Model	License Plate #	Vehicle License State

Other Vehicle's Direction of Travel
○ 01 North ○ 02 South ○ 03 East ○ 04 West ○ 05 Unknown

Damage Estimate
○ Over $501

Other Vehicle Driver's Injury Status (vehicle passengers are listed below)
○ 01 Fatal ○ 02 Incapacitating ○ 03 Non-incapacitating ○ 04 Possible ○ 05 None ○ 06 Not reported ○ 07 Unknown

Other Driver's Roadway Circumstances (that may have contributed to the crash)
○ 01 Debris
○ 02 Inoperative traffic device
○ 03 Missing traffic device
○ 04 Obscured traffic device
○ 05 Obstruction in roadway
○ 06 Shoulder
○ 07 Road surface condition
○ 08 Ruts, holes, bumps
○ 09 School zone
○ 10 Work zone
○ 11 Worn, polished road surface
○ 12 None
○ 13 Other*
○ 14 Unknown

Other Driver's Vehicle Action
○ 01 Avoiding objects in road
○ 02 Backing
○ 03 Changing lanes
○ 04 Entering traffic lane
○ 05 Leaving traffic lane
○ 06 Making U-turn
○ 07 Merging
○ 08 Out of control
○ 09 Passing
○ 10 Parked
○ 11 Skidding
○ 12 Slowing
○ 13 Starting in traffic
○ 14 Stopped
○ 15 Straight ahead
○ 16 Turning right
○ 17 Turning left
○ 18 Other*
○ 19 Unknown

Other Driver's Traffic Control (traffic control for the other driver may have been different from yours)
○ 01 Flashing signal
○ 02 No traffic controls
○ 03 Road construction signs
○ 04 RR crossing device
○ 05 School zone signs
○ 06 Stop sign
○ 07 Traffic control signal
○ 08 Warning signs
○ 09 Officer / Flagman / Guard
○ 10 Yield sign
○ 11 Other*
○ 12 Unknown

Other Driver's Vehicle Configuration
○ 01 Dog sled
○ 02 Light truck (4 tires)
○ 03 Motorhome
○ 04 Motorcycle
○ 05 Off highway vehicle
○ 06 Passenger car
○ 07 Pedalcycle
○ 08 Pedestrian
○ 09 Other*
○ 10 Unknown

INJURY SECTION

(Fill in the name of injured person, injury status, telephone number, and which vehicle they occupied when the crash occurred)

Name	Injury Status	Telephone	Vehicle License
	○ 02 Incapacitating ○ 03 Non-incapacitating ○ 04 Possible ○ 05 None ○ 07 Unknown		
	○ 02 Incapacitating ○ 03 Non-incapacitating ○ 04 Possible ○ 05 None ○ 07 Unknown		
	○ 02 Incapacitating ○ 03 Non-incapacitating ○ 04 Possible ○ 05 None ○ 07 Unknown		
	○ 02 Incapacitating ○ 03 Non-incapacitating ○ 04 Possible ○ 05 None ○ 07 Unknown		

YOUR INSURANCE INFORMATION — CERTIFICATE OF INSURANCE

Failure to complete the Certificate of Insurance could result in the suspension of your driver's license)

CRASH INFORMATION

Crash Date	Crash Location

DRIVER INFORMATION

Your Name (Driver's Last Name, First Name, Middle Initial)		Your Date of Birth	Your Driver's License Number	Your Driver's License State
Your Mailing Address	Your City	Your State	Your Zip Code	Your Contact Telephone

VEHICLE OWNER INFORMATION

Vehicle Owner's Name (Last Name, First Name, Middle Initial)		Owner's Date of Birth	Owner's License Number	Owner' License State
Vehicle Owner's Mailing Address	Owner's City	Owner's State	Owner's Zip Code	Owner's Contact Telephone

VEHICLE INFORMATION

Vehicle year	Vehicle make	Vehicle model	License plate #	Vehicle License State	Vehicle Identification Number (VIN)

INSURANCE INFORMATION

Did you have a current automobile liability policy in effect covering this accident? ○ YES ○ NO

Insurance Company or Insurance Carrier Name	Insurance Policy Number
Address and Telephone Number of Insurance Agent	Insurance Policy Period: FROM TO

SIGNATURE

YOUR SIGNATURE

Insurance Verification: If the motor vehicle liability insurance policy listed above was not in effect for the motor vehicle listed at the time of the crash indicated above, the insurance company is to complete the following and return this form to the Division of Motor Vehicles at the address listed on the bottom right corner on page 2 of this form. If indicated coverage was in effect at the time of the crash, no action is required.

REASON FOR DENIAL:

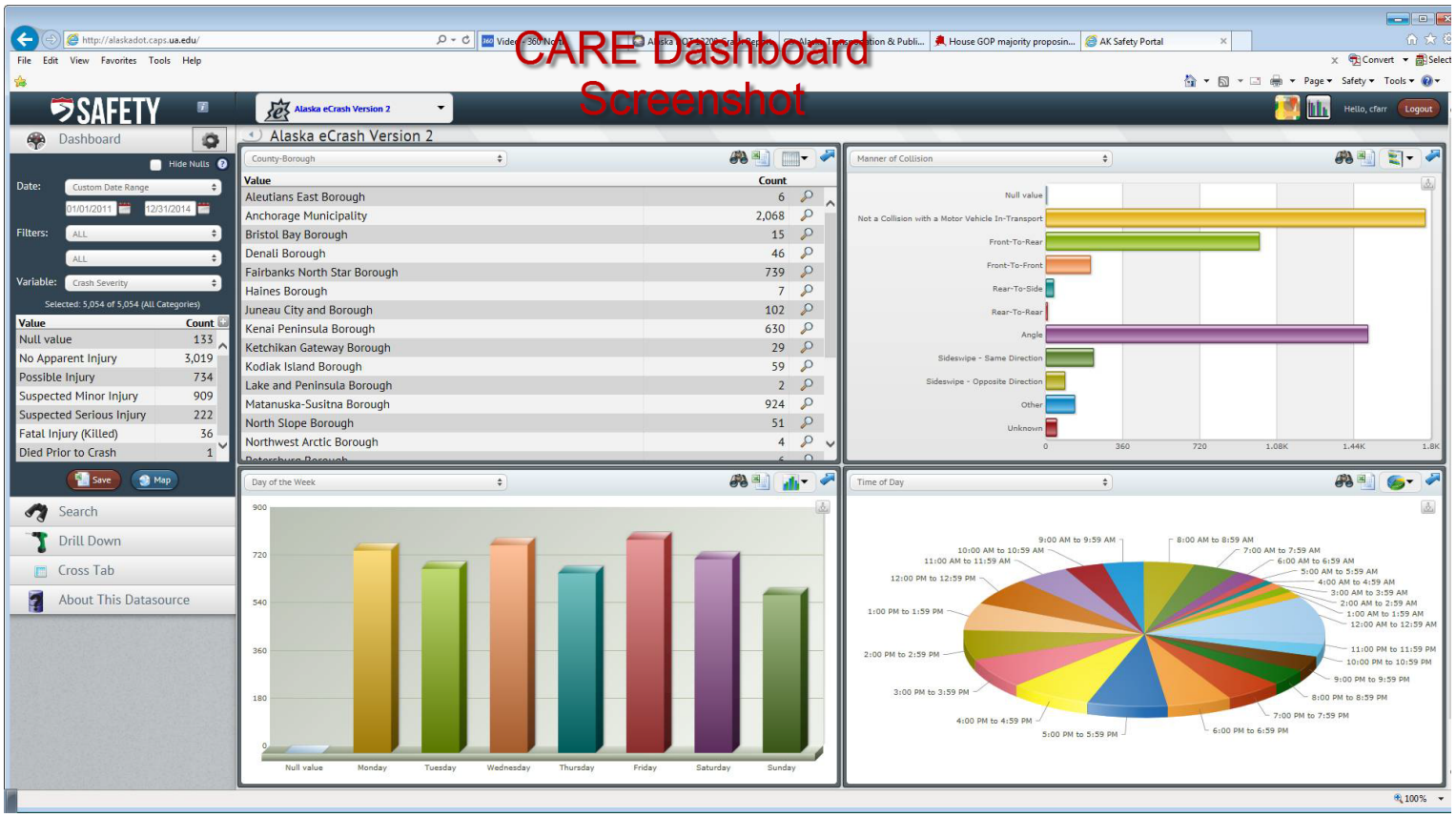
○ Policy expired before crash
○ Policy effective after crash
○ Policy number given is incorrect
○ Driver is not covered on policy
○ Lapse in policy
○ Other: _____

_____
Authorized Representative Signature / Date

MAIL THIS FORM TO:

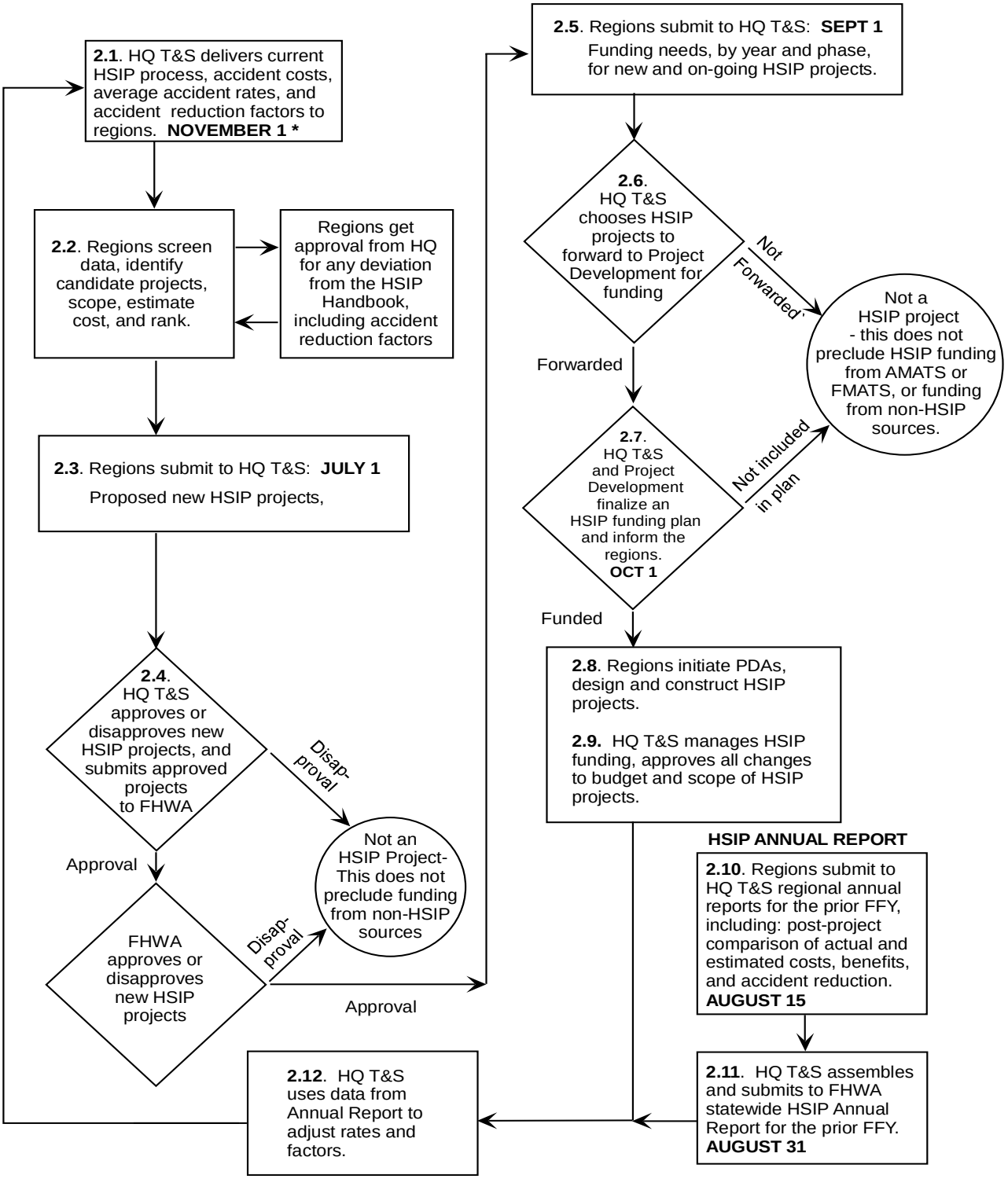
DMV Main Office
P.O. Box 110221
Juneau, AK 99811-0221
(907) 465-4361

CARE Dashboard Screenshot



2. Process Steps (Keyed to the Flow Chart)

Annual HSIP Process Flow Chart



*** NOVEMBER 1** is a target date which depends on availability of crash data prepared by others. HSIP will strive to meet the target and will communicate any expectation of delay to the regions and FHWA Division Office.

F. Washington
    1. Data Office
        a. Transportation Data & GIS Office Brochure
        b. Washington State Crash Analysis Flow
        c. WSDOT Collision Data Systems Overview
    2. State Roads
        a. Safety Flow Chart – State roads
    3. Local Programs
        a. Local Guide (cover and index only)

2015

Transportation Data & GIS Office

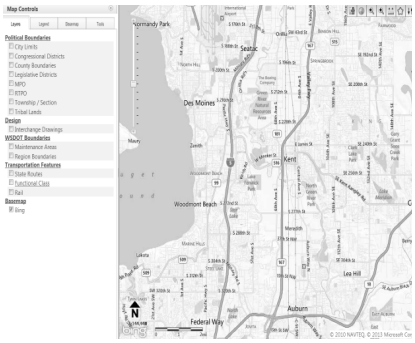
Washington State Department of Transportation

What We Do

We support the maintenance, preservation and operation of the Washington State transportation system by providing customers with timely, accurate and reliable roadway, traffic and crash data. We collect, process, analyze and report data for over 7,000 miles of state routes and over 80,000 miles of public roads. We deliver specialized GIS products and services in support of business operations throughout WSDOT.

Key Customers

FHWA	Legislature	Governor's Office	Counties
Cities	Public	Congress	Academic Institutions
State Agencies	Law Enforcement	Private Businesses	Traffic Safety Commission



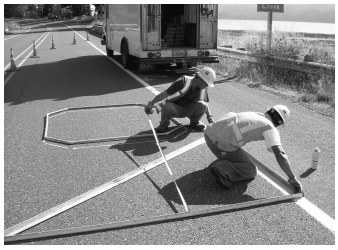
Goals

- Gather once, share with many
- Be responsive to our customers data needs
- Meet state and federal reporting requirements
- Maximize efficiency by applying Lean methodologies

Key Products

Data

- **Crash Data** - Current and past crash information, used to improve public safety.
- **Traffic Data** - Vehicle information (type, weight) and traffic volumes, used to improve mobility.
- **Roadway Data** - Current and past roadway information (number of lanes and surface type), used for project planning and improvement.
- **Federal Functional Class** - Inventory of over 80,000 miles of public roads, used in determining the apportionment of federal funds.
- **Highway Performance Monitoring System (HPMS) -** Information on the condition, performance and safety of all public roads, used in determining the apportionment of federal funds.
- **Roadway Classification Report** - Spatial datasets including State Routes, Freight and Goods, Urban Growth Areas, used by state, local and federal agencies.
- **Maps** - Provides cartographic representation of WSDOT data products, used to represent Functional Class, HPMS, milepost locations, and state highway features.



Reports and Maps

- **Annual Traffic Report** - Summarizes traffic data maintained by WSDOT for the State Highway System, used to report traffic data for all state highways.
- **State Highway Log** - Provides mile post locations of features on or along state routes. Features include intersections, lane mileage, and jurisdiction, used to support HPMS and other operational activities.
- **Quarterly Speed Report** - Evaluates vehicle speed trends to assist in highway design and safety improvements, used by the Washington State Patrol to identify locations for emphasis patrols.
- **Road Life Report** - Provides historical pavement information on all state routes, used by the Washington State Pavement Management System to forecast highway construction projects.
- **Horizontal/Vertical Alignment Report** - Provides curve data for all state routes, used by designers in determining recommended curve speed and sight distance requirements for safe passing zones.
- **Roadway Classification Report** - Provides jurisdictional information of all state routes, used for establishing tax rates charged in construction projects.
- **Mapping Products** - Provides cartographic representation of data for visualization and analysis, including State Route System, Infrastructure Assets, Functional Class, Highway Features, Crashes, Performance Measures, and many others.

Applications

- **GIS Application Development** - Interactive mapping applications are developed and supported for use throughout the agency and by the public. These applications support data collection, stewardship and analysis to improve operations, reporting and decision making.
- **GeoPortal** - An easy to use customizable system which provides web mapping to Maintenance and Operations, Freight, Aviation, Traffic and the public.
- **SRview** - State route video log, used to reduce costs by eliminating field visits while increasing safety.

Services

- **Crash Analysis** – Custom crash data analysis used to support highway safety studies.
- **Highway Travel Analysis** – Custom traffic analysis used for mobility and freight projects, traffic forecasting, and capacity analysis.
- **GIS Training and Support** - Provides technical support and organizational services related to the use of GIS software applications, data and commercial products to WSDOT's GIS community.
- **Traffic Sensor Installation and Support** – Installs automatic data collection and weigh-in-motion devices in the roadway surface which provide data on congestion and pavement stress.
- **Cloud Hosted GIS** - Governance and support of WSDOT's ArcGIS Online environment for the WSDOT Enterprise; provides an open collaborative environment which is used by many WA state agencies and many other DOTs for interactive mapping.

MARK FINCH Manager - Transportation Data and GIS Office

FinchM@wsdot.wa.gov 360-570-2369 office 360-789-7739 cell

http://www.wsdot.wa.gov/mapsdata/tdgo_home.htm

Washington State Crash Analysis Flow

State and Local law Enforcement Officers

Police Traffic Collision Reports (PTCR) are received electronically from law enforcement and are automatically validated for completeness and accuracy.

PTCR's received electronically are available for public disclosure immediately upon acceptance.

WSP Staff Embedded within WSDOT

On a daily basis a Washington State Patrol (WSP) embedded team in WSDOT receive paper PTCR submitted by local law enforcement.

WSP Staff perform an initial quality control and then scan and index the reports into WSDOT's Crash Location and Analysis System (CLAS) along with WSP Public Disclosure System.

PTCR's received electronically are available for public disclosure with 48 hours.

Data Analysis Workflow

WSDOT Data Analyst reviews and refines if appropriate up to 121 data elements submitted by the law enforcement officer on the PTCR. WSDOT analyst will also use internal tools to geocode the location of the crash and derive an additional 21 engineering related data elements to the crash safety record.

Quality Assurance Workflow

Currently WSDOT is reviewing 1 in every 100 crash reports in the Quality Assurance Workflow. WSDOT will increase this QA rate when coding methodologies and procedures are changed, new employees join the team, or a new data elements is added to the record.

WSDOT Staff

Daily Feeds

- Department of Licensing Images/Data
- FARS Data Only
- WSP Commercial Vehicle Division Data/Images

Weekly Data Feeds

- Department of Licensing
- Department of Social and Health Services
- Crash Data Mart
- WSDOT Crash Data Portal
- National Automobile Sampling System

Monthly Data Feeds

- City Engineers
- County Engineers
- Washington Traffic Safety Commission
- Experian Automotive
- CARFAX

Annual Data Feed

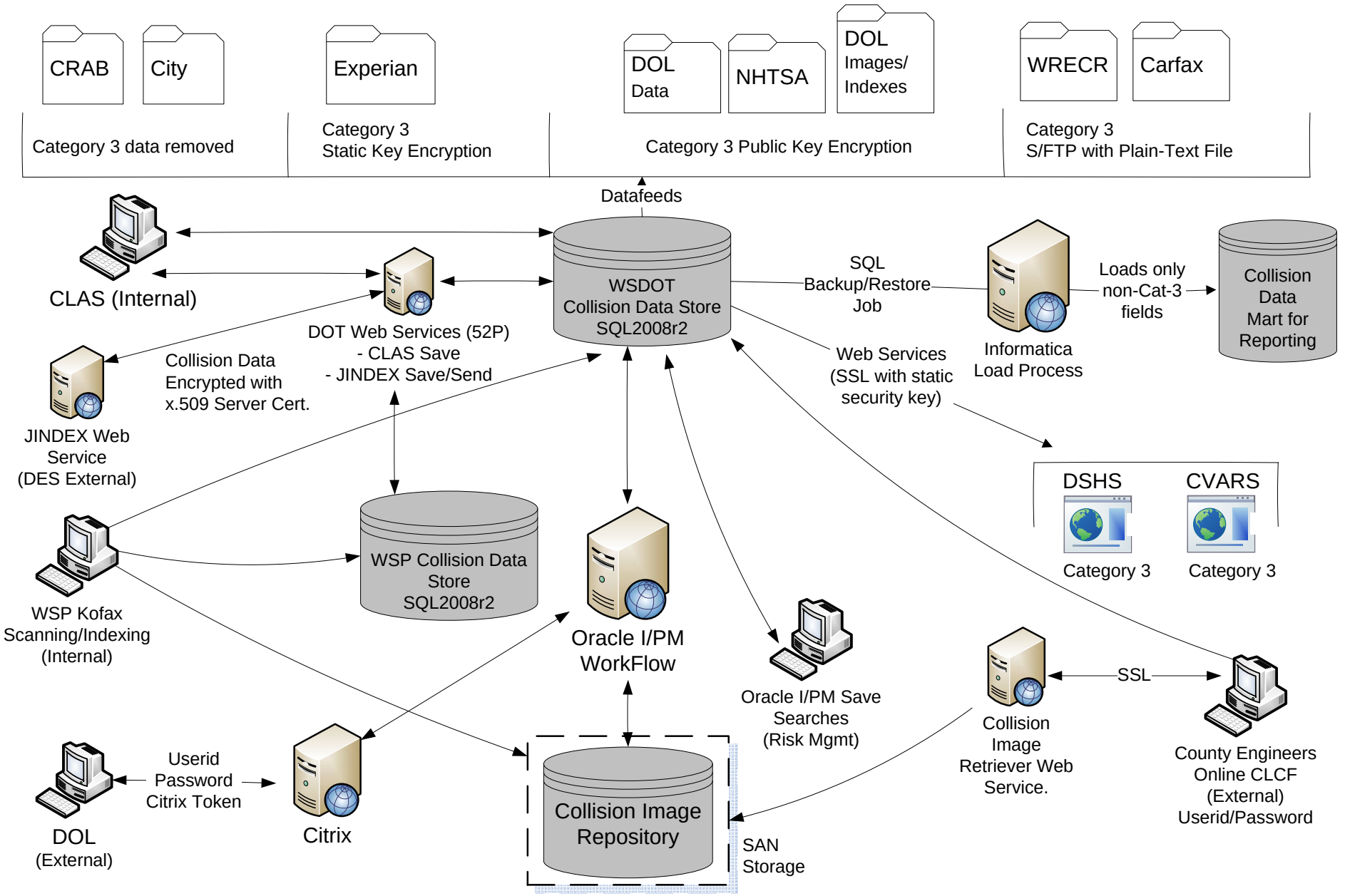
- Department of Health
- HSIS
- NHTSA

Crash Data Mart (Specific Data Requests)

- Media
- Researchers
- Consultants
- Attorneys
- State Agencies
- Local Agencies
- Private Citizens
- All Others

DRAFT

WSDOT Collision Data Systems Overview



Date: March 13, 2012

Safety Scoping Process for State Routes

HQ

Region

HQ & Region

Gateway Decision

Iterative process

Acronyms Used:
CPDM – Capital Program Development & Management Office
HSEC – Highway Safety Executive Committee
CAL/CAC – Collision Analysis Location/Collision Analysis Corridor
SA – Safety Analyst
GIS – Graphic Information System
PM – Program Management
CPMS – Capital Program Management System
IHSDM – Interactive Highway Safety Design Model
ISATe – Enhanced Interchange Safety Analysis Tool
HSM – Highway Safety Manual
HSIG – Highway Safety Issues Group

Develop Criteria
CPDM Lead
HSIG
Task: Develop and recommend screening criteria

Criteria Approval
HSEC
YES
NO

Location Identification
Sites with the Potential for Improvement
East/West
CPDM
Region Offices
Task: CPDM performs Network Screening for CAL and CAC. Two lists (Eastside/west side) are developed and reviewed. CPDM/Regions identify Intersection Analysis Locations (IAL).
Tool: SA, GIS, or Other

List Approval
HSEC
YES
NO

CAL/CAC/IAL Lists
CPDM
Task: CPDM finalizes and distributes lists to Regions

Collision Data Analysis
Countermeasure and Design Element Selection
Region Traffic, PM and Planning Offices
Task: Region Offices identify countermeasure and conduct benefit cost analysis
Tool: HSM, SA, IHSDM, ISATe, or others

Countermeasure Proposal Documentation
Region
Task: Emails proposed countermeasure documentation to CPDM

Collision Data Analysis document review
CPDM
YES
NO

Proposed Solution Review
Review Panel
Task: Region presents proposed countermeasure(s) for programming

HSEC/HSIG Review Panel Approval
YES
NO

Project Identification
Region PM
Task: Enter CPMS

Prepare Project Summary
Region PM
Region Traffic
Task: Project Summary development

Review and Approval
CPDM
Design Office
YES
NO

Program Project
Region PM
Task: Project is programed for Design. Enter CPMS

Programed Project List

Legislative Approved Budget → ***Design/ PS&E*** → ***Construction/ Maintenance***

Approved: April 26, 2012

Jay Alexander Director, Program Management Division	**Pasco Bakotich III, P.E.** State Design Engineer Director, Development Division	**Kathleen Davis** Director, Highways & Local Programs	**John Nisbet, P.E.** State Traffic Engineer Director, Traffic Operations Division	**Brian Smith, AICP** Director, Strategic Planning Division	**John Milton, Ph.D., P.E.** Director, Enterprise Risk Management Highway Safety Executive Committee Chair

Washington State
Department of Transportation

Local Agency Guidelines

M 36-63.31

April 2016

Local Programs
Engineering Services

Foreword

This manual provides local agencies with statewide policies and standards to follow when using Federal Highway Administration (FHWA) funds for transportation projects. Considerable effort has been made to provide guidance on how to accomplish the work under the current federal transportation act, Moving Ahead for Progress in the 21st Century (MAP-21). MAP-21 creates a streamlined and performance-based surface transportation program and builds on many of the highway, transit, bike, and pedestrian programs and polices established in 1991. Updating this manual is a continuing process. Questions, observations, and recommendations are invited. The Comment Request Form is provided to encourage comments. Please use it to transmit comments, including marked copies of manual pages, to WSDOT Local Programs.

/s/

Kathleen B. Davis
Director
Headquarters Local Programs

G. Oregon

1. Power Point of Safety Program with explanation of SPIS.

Oregon Department of Transportation

Project Safety Management System

Kevin Haas, P.E.

Traffic Investigations Engineer

Oregon Department of Transportation

Oregon Department of Transportation

Project Safety Management System

Safety at ODOT

- Transportation Safety Division
  - Education, Enforcement, Emergency Medical Services
  - Programs focus on changing behavior of motorists
  - Also responsible for the Transportation Safety Action Plan (112 Action Items to be implemented over next 20 years)
- Highway Division
  - Engineering Improvements
    - Safety, Modernization, Operations, Bridge
  - Design Standards
  - Other Programs Integrate Safety
    - Access Management,
    - Bike and Pedestrian Program,
    - Guardrail/Barrier upgrade program, etc.
  - Maintenance (Snow/Ice removal, Pavement markings, etc.)

Oregon Department of Transportation

Project Safety Management System

Do our STIP projects address the emphasis areas in the TSAP?

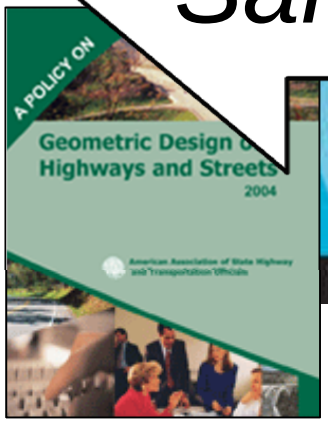
- Action Item 23—Safety funds should focus on reducing intersection, roadway departure, and pedestrian/bicycle crashes
- Action Item 32—Is highway safety weighted equally with other priorities in developing **all types** of STIP projects?

Oregon Department of Transportation

Project Safety Management System

Nominal Safety

Manual on Uniform

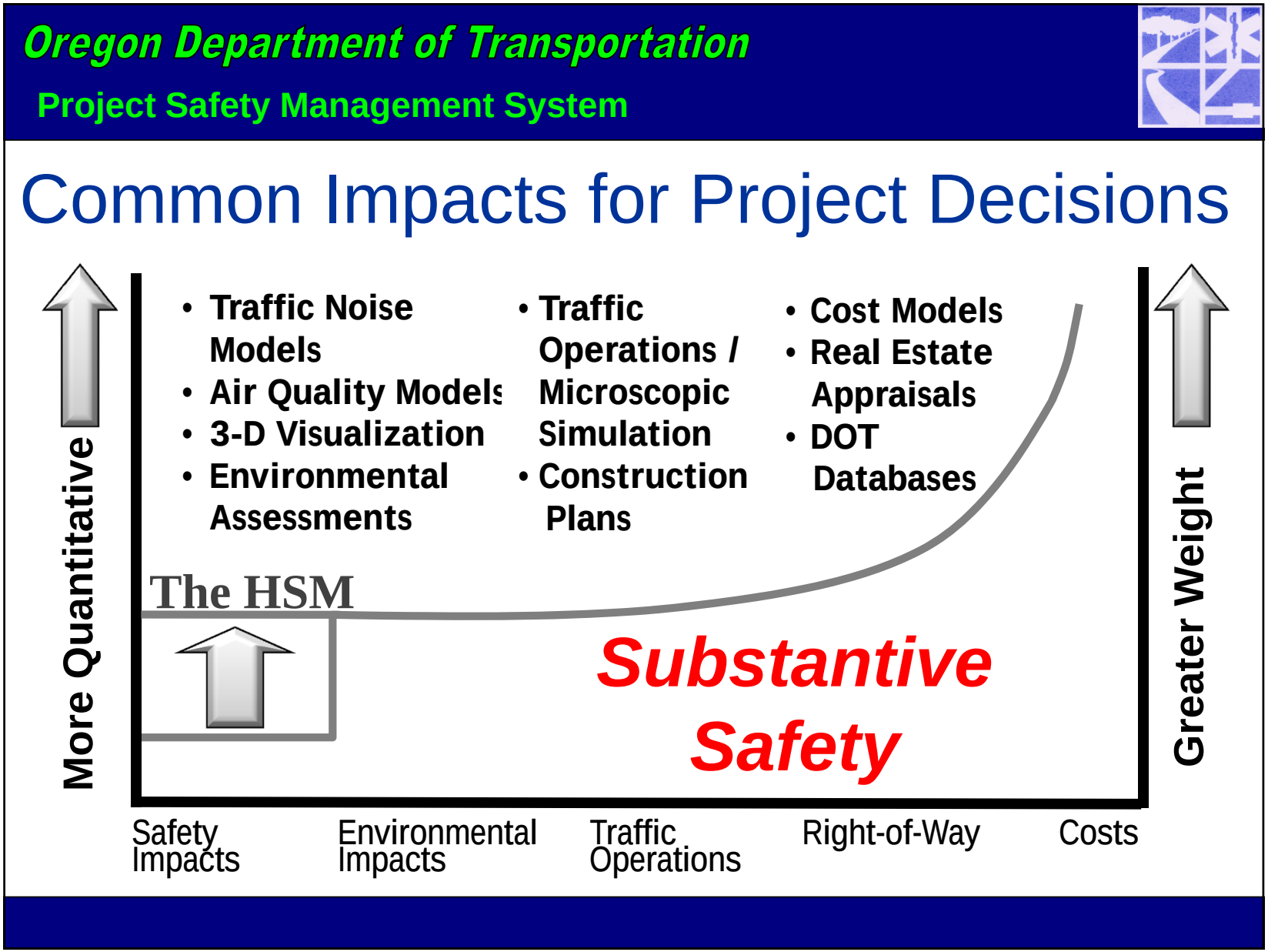


Standards Compliance

Substantive Safety

HSM
Highway Safety Manual

Predicting the safety impacts of projects programmed into the STIP


Oregon Department of Transportation
Project Safety Management System
Common Impacts for Project Decisions
More Quantitative
Greater Weight
• Traffic Noise Models
• Air Quality Models
• 3-D Visualization
• Environmental Assessments
• Traffic Operations / Microscopic Simulation
• Construction Plans
• Cost Models
• Real Estate Appraisals
• DOT Databases
The HSM
Substantive Safety
Safety Impacts
Environmental Impacts
Traffic Operations
Right-of-Way
Costs

Oregon Department of Transportation

Project Safety Management System

What should be the Primary Objective for STIP Safety Projects?

Reduce the number of fatal and serious injury crashes on Oregon Highways!

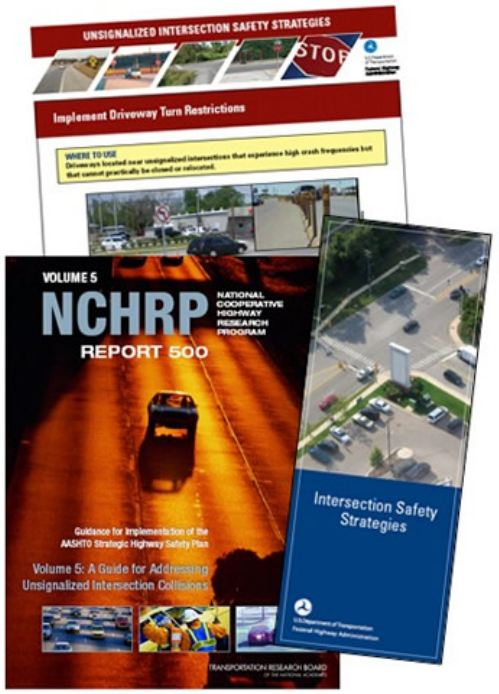
Matches objectives of the “Toward Zero Deaths” national initiative to focus safety funding on prevention of fatal & serious injury crashes

Oregon Department of Transportation

Project Safety Management System

How do we accomplish this objective in the STIP Process?

- Network Screening
- Diagnosing Problems
  - Tools
- Project Selection
- Evaluation
- Research & Training



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Project Safety Management System

High Crash Sites (Network Screening)

A Data Driven Process:

- Safety Priority Index System (SPIS)
  - Oregon DOT's primary tool for selecting and identifying problem locations since 1986
  - Updated formulation in 1998
  - Other States use similar tools with different formulations

Oregon Department of Transportation

Project Safety Management System

High Crash Sites (Network Screening)

SPIS = Frequency + Rate + Severity

(using 3 years of Crash data to generate a composite index)

- Crash Frequency (25%)
  - 150 crashes in a tenth of a mile produces a maximum score of 25
- Crash Rate (25%)
  - 7 crashes per mvm produces a maximum score of 25
- Crash Severity Ranking (50%)
  - Fatal and Injury A crashes 100 points each
  - Injury B and C crashes 10 points each
  - PDO crashes 1 point each
  - 300 points produces a maximum score of 50

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Project Safety Management System

High Crash Sites (Network Screening)

- Regional and Statewide reports
  - 7 report types and GIS maps
- Region Staff:
  - Evaluate the top 5% sites (or top 10%)
  - Diagnose the problem
  - Reports the results

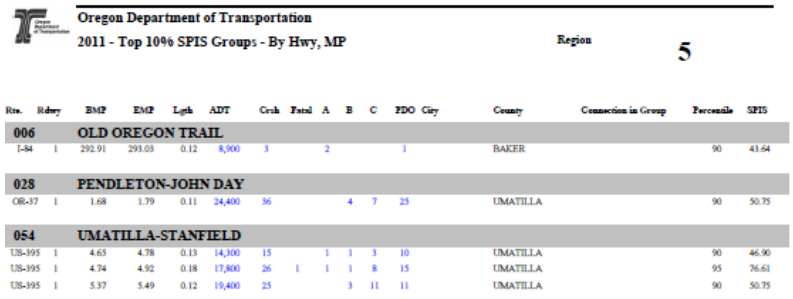
Oregon Department of Transportation

Project Safety Management System

Diagnosing Crash Problems

Steps to Diagnosing Safety Problems

- Quantify crashes by type and severity
- Identify any patterns
- Determine major causes
- Evaluate safety improvements for:
  - Potential crash reductions
  - Cost benefit



Oregon Department of Transportation

2011 - Top 10% SPIS Groups - By Hwy, MP

Region 5

Rte.	Rdwy	BMP	EMP	Lgth	ADT	Crsh	Fatal	A	B	C	PDO	City	County	Connection in Group	Percentile	SPIS
006		**OLD OREGON TRAIL**														
I-84	1	292.91	293.03	0.12	8,900	3		2			1		BAKER		90	41.64
028		**PENDLETON-JOHN DAY**														
OR-37	1	1.68	1.79	0.11	24,400	36			4	7	25		UMATILLA		90	50.75
054		**UMATILLA-STANFIELD**														
US-395	1	4.65	4.78	0.13	14,300	15		1	1	3	10		UMATILLA		90	46.90
US-395	1	4.74	4.92	0.18	17,800	26	1	1	1	8	15		UMATILLA		95	76.61
US-395	1	5.37	5.49	0.12	19,400	25			3	11	11		UMATILLA		90	50.75

Oregon Department of Transportation

Project Safety Management System

Diagnosing Crash Problems

Hard to identify the best treatment:

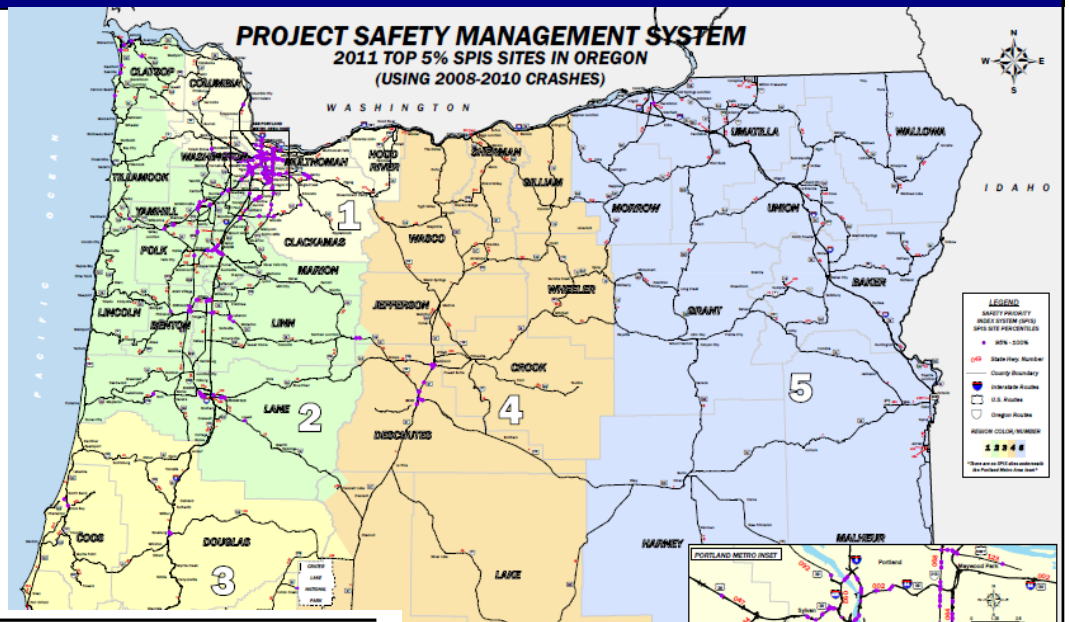
- Diagnosis of a problem is not always self evident
- Requires expert knowledge
- Does not always mean there is a cost effective fix

So we developed a number of tools to help investigators!

Oregon Department of Transportation

Project Safety Management System

SPIS Maps and Reports



Oregon Department of Transportation

2011 - Top 10% SPIS Groups - By Hwy, MP

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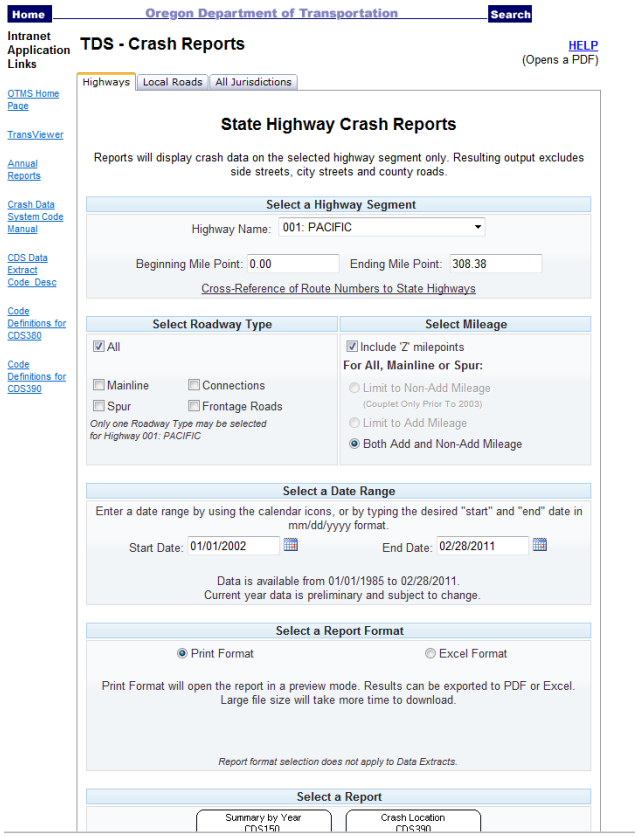
028		**PENDLETON-JOHN DAY**														
OR-37	1	1.68	1.79	0.11	24,400	36			4	7	25		UMATILLA		90	50.75
054		**UMATILLA-STANFIELD**														
US-395	1	4.65	4.78	0.13	14,300	15		1	1	3	10		UMATILLA		90	46.90
US-395	1	4.74	4.92	0.18	17,800	26	1	1	1	8	15		UMATILLA		95	76.61
US-395	1	5.37	5.49	0.12	19,400	25			3	11	11		UMATILLA		90	50.75

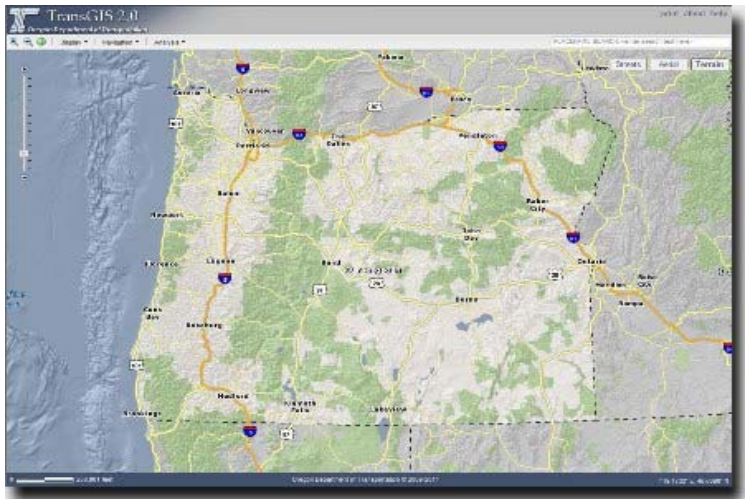
Oregon Department of Transportation

Project Safety Management System

Crash Data



TransGIS & STIP Scoping Tool



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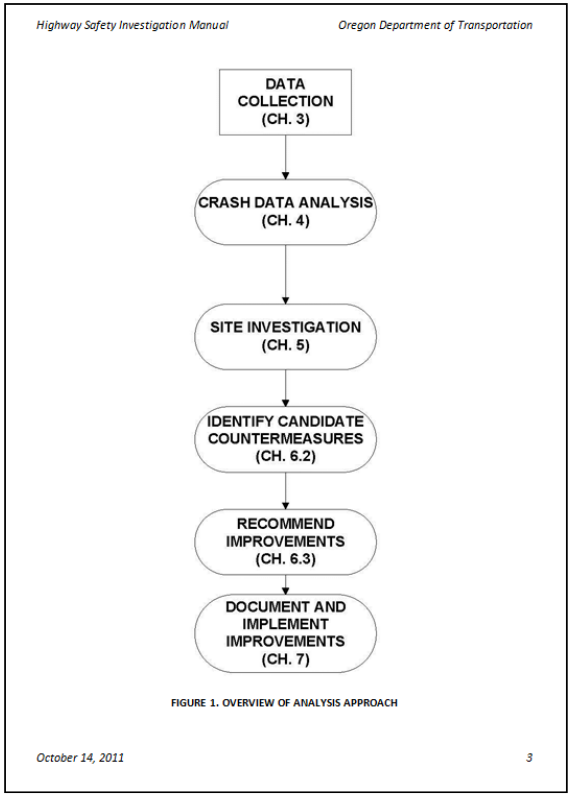
Project Safety Management System

Safety Investigations Manual



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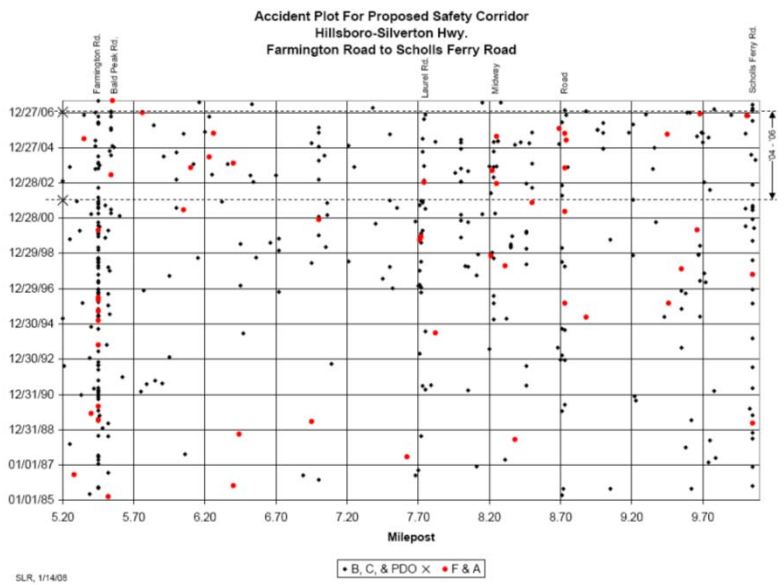
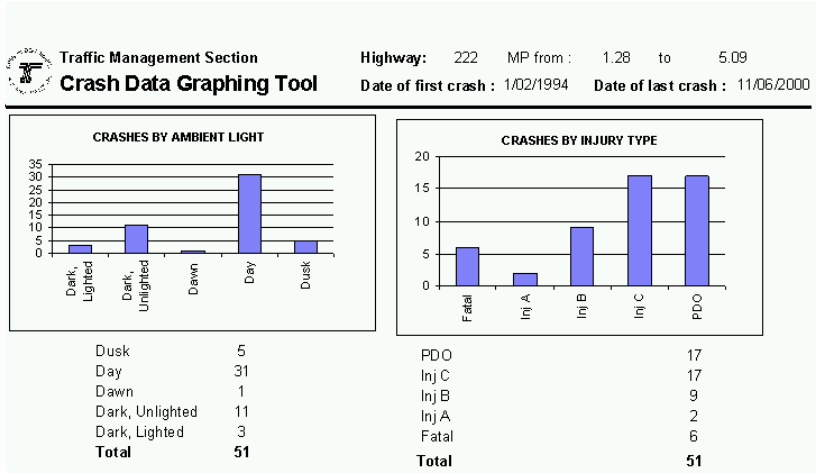
Project Safety Management System

Scatter Plots



Crash Graphing Tool



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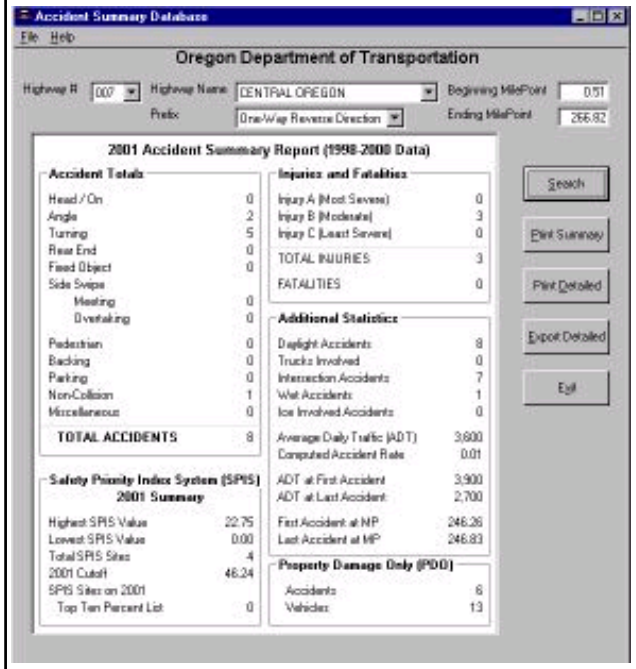
Crash Summary Database



ODOT Digital Video Log & Google Maps

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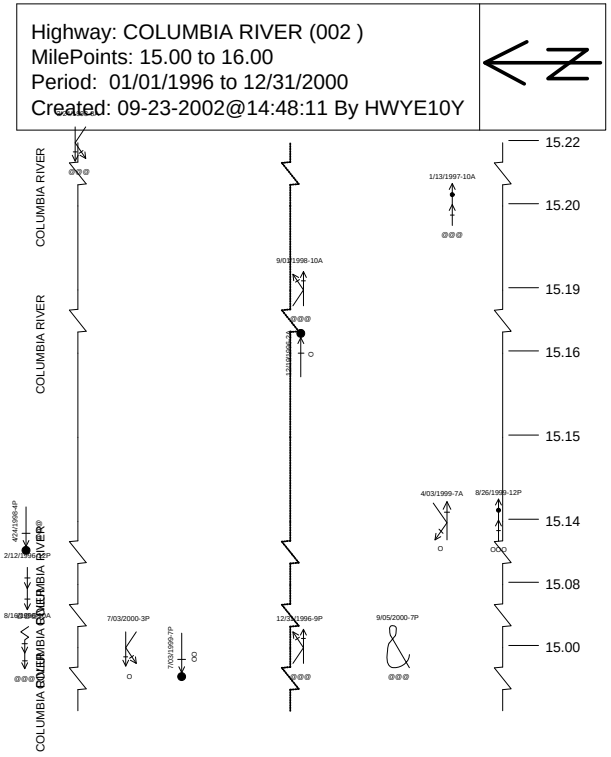
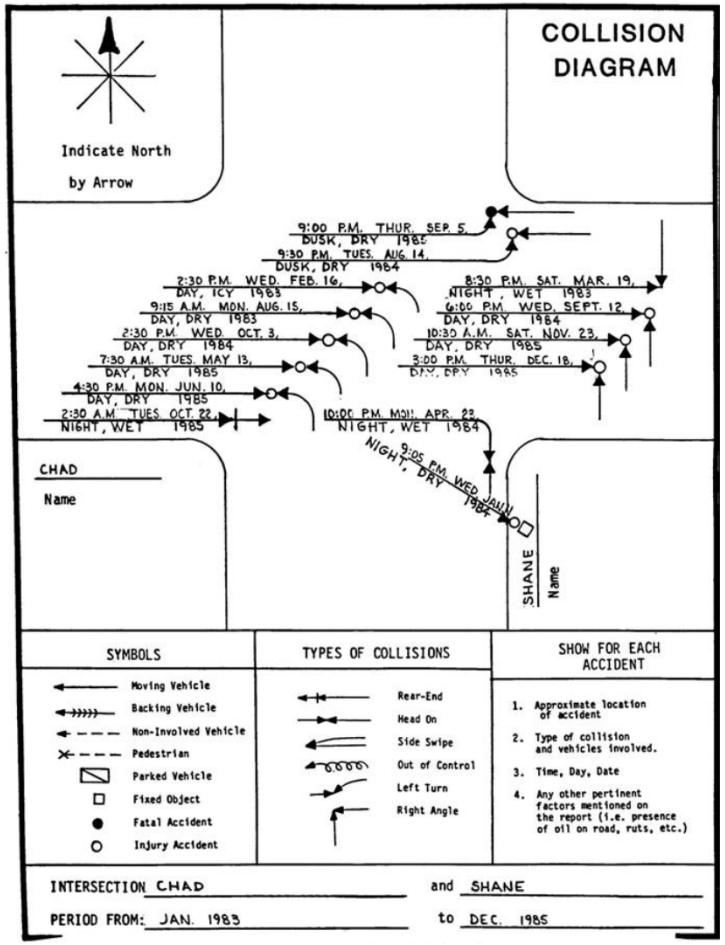
Project Safety Management System

Crash Diagram Tools





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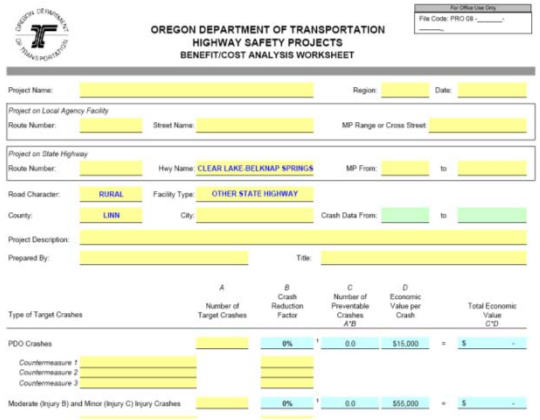
Project Safety Management System

Crash Modification Factors

B/C Worksheet



Proven and cost effective treatments,
Get the most bang for the buck!

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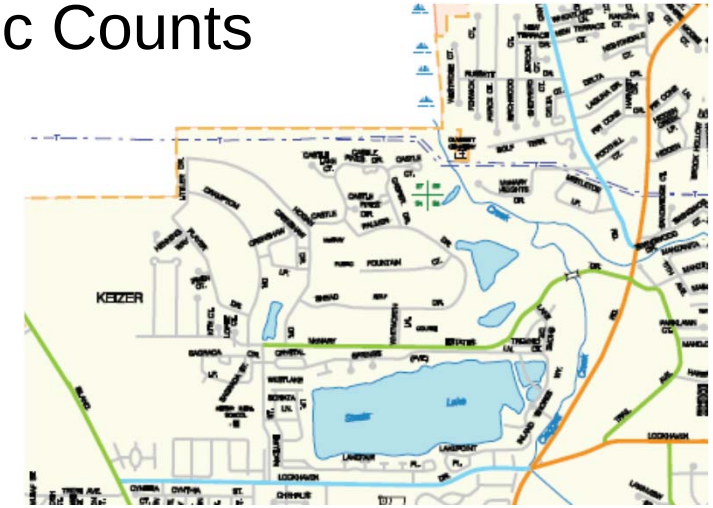
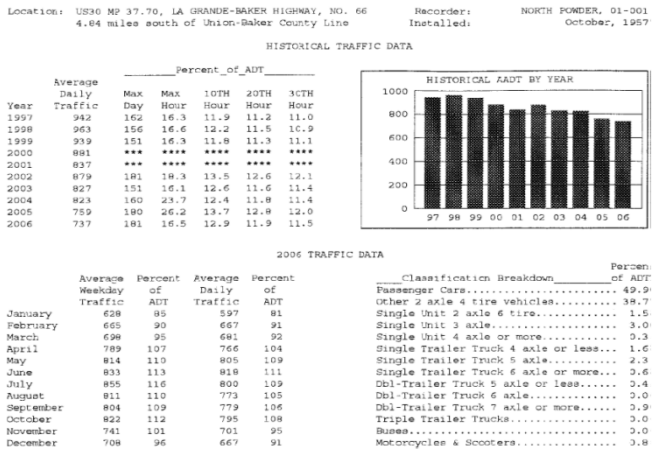
Other Tools and Data available

- Aerial Photography
- Maps
- Asset Management
- Traffic Counts





Location: US30 MP 37.70, LA GRANDE-BAKER HIGHWAY, NO. 66 — 4.84 miles south of Union-Baker County Line
Recorder: NORTH POWDER, 01-001
Installed: October, 1957

HISTORICAL TRAFFIC DATA

Year	Average Daily Traffic	Max Day	Max Hour	10TH Hour	20TH Hour	30TH Hour
		Percent of ADT				
1997	942	162	16.3	11.9	11.2	11.0
1998	963	156	16.6	12.2	11.5	10.9
1999	939	151	16.3	11.8	11.3	11.1
2000	881	***	****	****	****	****
2001	837	***	****	****	****	****
2002	879	181	18.3	13.5	12.6	12.1
2003	827	151	16.1	12.6	11.6	11.4
2004	823	160	23.7	12.4	11.8	11.4
2005	759	180	26.2	13.7	12.8	12.0
2006	737	181	16.5	12.9	11.9	11.5

HISTORICAL AADT BY YEAR

2006 TRAFFIC DATA

	Average Weekday Traffic	Percent of ADT	Average Daily Traffic	Percent of ADT
January	628	85	597	81
February	665	90	667	91
March	698	95	681	92
April	789	107	766	104
May	814	110	805	109
June	833	113	818	111
July	855	116	800	109
August	811	110	773	105
September	804	109	779	106
October	822	112	795	108
November	741	101	701	95
December	708	96	667	91

Classification Breakdown	Percent of ADT
Passenger Cars	49.9
Other 2 axle 4 tire vehicles	38.7
Single Unit 2 axle 6 tire	1.5
Single Unit 3 axle	3.0
Single Unit 4 axle or more	0.3
Single Trailer Truck 4 axle or less	1.6
Single Trailer Truck 5 axle	2.3
Single Trailer Truck 6 axle or more	0.6
Dbl-Trailer Truck 5 axle or less	0.4
Dbl-Trailer Truck 6 axle	0.0
Dbl-Trailer Truck 7 axle or more	0.9
Triple Trailer Trucks	0.0
Buses	0.0
Motorcycles & Scooters	0.8

Oregon Department of Transportation

Project Safety Management System

Project Selection- Typical Prioritization

- Region Traffic Generates List of Proposed Safety Projects:
  - Use SPIS list, Public Input and District Input
  - List amounts to about 150% of the Region Safety funding
  - Projects checked for eligibility (either SPIS or B/C)
  - Prioritized by the Benefit/Cost
- Projects are scoped to:
  - Clarify cost and update Benefit/Cost.
  - Clarify problems such as right of way or environmental issues

Oregon Department of Transportation

Project Safety Management System

Project Selection- Typical Prioritization

- Projects are reviewed, ranked by priority and constrained to funding by Region Management
  - May be matched to other projects or funding types.
  - Re-prioritized based on schedules and availability of resources.
  - Readiness of the project and local leverage can play into the selection.
- Region Management approves list of Safety projects and documents decision process.

Oregon Department of Transportation

Project Safety Management System

Project Selection- Typical Prioritization

- Projects are verified by Salem HQ to meet criteria for eligibility.
- Safety Projects are programmed in draft STIP.
- Draft STIP is shared with Area Commissions on Transportation
- Regions gather comments on the draft STIP.

Oregon Department of Transportation

Project Safety Management System

Evaluations

- FHWA HSIP Report and evaluation
  - Top 5% sites
  - Before/After evaluation of all Safety Projects
- Roadway Departure Projects
- Rumble Strip installations
- Interstate Speed changes
- Illumination reductions
- Interstate Median Crossover Crashes

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Project Safety Management System

Research

- Safety of High Speed Signalized Intersections
- Implementation of Collision Diagramming Tools
- Assessment of Statewide Intersection Safety Performance
- Calibrating HSM Predictive Methods for Oregon
- Identify ODOT crash & roadway inventory data deficiencies to implement HSM
- Multi-State pooled fund study with other State DOTs on how to implement the HSM

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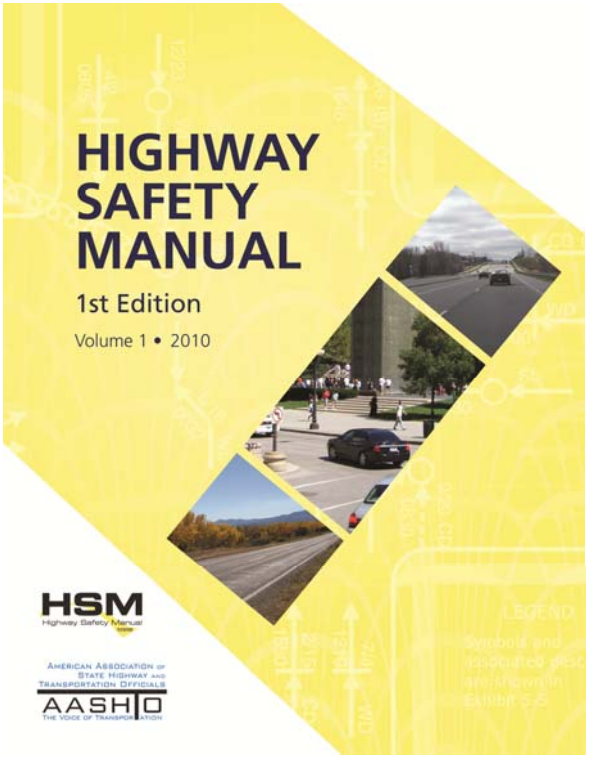
Project Safety Management System

AASHTO Highway Safety Manual

- ***"Road safety management is in transition. The transition is from action based on experience, intuition, judgment, and tradition, to action based on empirical evidence, science, and technology…"***



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Project Safety Management System

Training

- Explicit Consideration of Safety
- Highway Safety Manual
  - Human Factors
  - New Approaches to Highway Safety
  - SafetyAnalyst software
- Road Safety Audits
- Institutional Needs in Highway Safety Planning
- Improving Pedestrian Crossing Safety
- Roadside Design Guide

Oregon Department of Transportation

Project Safety Management System

Questions?

Kevin Haas, P.E.
Traffic Investigations Engineer
Oregon Department of Transportation

H. Idaho

1. IMPACT press release

The Peter K. O'Rourke Special Achievement Award

The **Peter K. O'Rourke Special Achievement Awards** recognize notable achievements in the field of highway safety during the prior calendar year by individuals, coalitions, organizations, nonprofit groups, businesses, government agencies, universities or programs. About Peter K. O'Rourke

2005 Winner: The Idaho Transportation Department's Office of Traffic and Highway Safety's IMPACT 2K and WebCARS Software

GHSA Highway Safety Awards

Log-in page to WebCARS, a crash analysis software produced by the Idaho Transportation Department's Office of Traffic and Highway Safety.

In 2003, the Idaho Transportation Department's Office of Traffic and Highway Safety was backlogged seven months in motor vehicle crash data. The paperwork involved in completing the standard Idaho Vehicle Crash Report was time consuming and led to inaccuracies. Idaho's Crash Analysis Reporting System (CARS), a software program designed to assist in the analysis of motor vehicle crash data, was expensive, licensed software that proved incapable of keeping pace with the incoming crash data.

The Office of Traffic and Highway Safety in Idaho responded with the Idaho Mobile Program for Accident CollecTion (IMPACT 2K), software designed to complete crash reports electronically, and the WebCARS software program designed to replace CARS. IMPACT 2K allows officers to easily record data at the scene of a crash in half the time as by hand. WebCARS, an Internet-based crash analysis tool, is a free, comprehensive application that effectively detects high crash locations, performs intersection analysis, sorts crashes by location, time of day and severity and includes other programs for monthly and yearly summaries.

IMPACT 2K software electronically transmits crash data to WebCARS, creating an advanced, timely crash data collection and analysis system available 24 hours after the information is uploaded. Before IMPACT 2K, the average time it took data to be entered into Idaho's system was 23 days. Data technicians now enter crash reports at a speed three times faster than before, allowing technicians to spend more time analyzing each crash. Thirty-eight agencies with 104 users use WebCARS to analyze crash data in Idaho. Eighty-seven percent of the state's law enforcement agencies are using IMPACT 2K.

No longer hampered by the inability to record and analyze highway data, the electronic software provides an efficient solution for implementing and evaluating highway safety policies and programs.

For more information please contact Mike Elmer at mike.elmer@itd.idaho.gov.

phone 202.789.0942 , **fax** 202.789.0946, **headquarters@ghsa.org**

I. Colorado
    1. Example of Before/After Analysis

BEFORE/AFTER
SAFETY ANALYSES

Prepared for:

Colorado Department of Transportation
Traffic and Safety Engineering Branch
4201 East Arkansas Avenue
Denver, Colorado 80222

Prepared by:

Felsburg Holt & Ullevig
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Colorado Springs, CO 80903
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DiExSys, LLC
8608 W. Mountain View Lane
Littleton, CO 80125

FHU Reference No. 114271-01
January 2016

INTRODUCTION

The purpose of this study was to determine the effects of safety improvements on safety performance at locations chosen by the Colorado Department of Transportation (CDOT). This report discusses the results at 12 locations that were analyzed and the methodology used in the process. In addition, this report discusses the need to institutionalize the process of evaluating safety outcomes of constructed projects.

An overview of the methodology used in the before/after analysis for each location is provided in **Appendix A**.

ANALYSIS AND RESULTS

Fifteen locations were chosen by CDOT for analysis for this study. Those locations included state highways and non-state highways covering a variety of safety improvements. Analyzed roadway improvements included: guard rail, cable rail, concrete median, a weather warning system, and deer fencing. Intersection improvements analyzed included: a new signal, additional turn lanes, improving geometry to get rid of split phases, adding protected left-turn phasing, and signal upgrades such as larger signal heads and replacing old span-wire signals.

Three of the non-state highway study locations had poor data availability, and we were unable to accurately analyze them without implementing unified street naming convention and manual quality control for the off system crashes. The remaining 12 projects were analyzed and are provided in **Table 1** with the location, type of project, and resulting benefit/cost (B/C) ratio. As shown, many of the B/C ratios were greater than anticipated at the time of application for funding. Of the 12 safety projects analyzed, 3 showed no improvement or deterioration in safety performance in the after period and may not have been justified. The 3 projects with little to no improvement included:

- # 15505 - Deer fencing and cattle guards on US 550. The number of wild animal crashes was reduced following construction as would be expected. However, the crashes were more severe in the after period causing the B/C ratio to be below one.
- #16006 - Intersection improvements at SH 45 and Red Creek Springs. The number of crashes in the before and after period were approximately the same, but the severity of crashes increased in the after period. It is unclear why the severity of crashes increased following this improvement project.
- #16010 – New signal at Industrial and Purcell. The number of broadside crashes decreased after the signal was constructed, but several other crash types saw an increase in number of crashes including approach turns, rear-ends, and sideswipes. In addition, the severity of crashes increased. The signal was warranted, but the results suggest that an intersection with volumes that just meet warrants might have better safety outcomes with a roundabout.

Project Information

Project Name: US 550 near Ridgway State Park

Project Description: Install Double Cattle Guards and Extend Deer Fencing

CDOT Region: 5 Project Def: 15505 County: Ouray

Location: US 550 Mile Points: from 107 to 111 Length: 4 miles

Schedule: Work Start Date: 3/20/2007 Completion Date: 5/16/2008

Problem Description: As described in the Highway Safety Improvement Program (HSIP) application for this project, the ten-year crash history (1994 – 2003) showed that there were a total of 18 injury crashes (31 injuries), 50 PDO crashes, but no fatalities. This total included 23 wildlife related crashes. Much of the highway right of way (ROW) has deer fencing from approximately MP 106 to MP 113. The main entrance to Ridgway State Park is near MP 107, and it did not have any means to prevent wildlife from entering the ROW and being caught between the fencing along the corridor.

Improvement Description: Between March 20, 2007 and May 16, 2008, a double wildlife (cattle) guard was installed across the main entrance to the park and the existing deer fencing was extended to meet the new wildlife guard. It was anticipated that this would eliminate a primary entry point for wildlife to enter the highway ROW. The cost of construction was $295,155.

The HSIP application anticipated that a 30% reduction in all types of crashes might be realized by the improvement. The initial benefit/cost ratio was estimated to be 1.81.

Summary and Findings

The analysis of safety before and after the double wildlife (cattle) guard was installed as a barrier across the main entrance to the Ridgway State Park from US 550 showed an overall reduction in the wildlife type of crash that a wildlife guard is designed to mitigate. For this segment of 2-lane arterial highway, there were 44 total crashes during the five-year period before the wildlife guard was installed (2002 – 2006). In the five years after construction (2009 – 2013), the number of crashes decreased to 28. This decrease in crashes was accompanied by a modest increase in AADT reflected by the frequency SPF. In addition, the number fatal crashes also diminished although the number of injury crashes (and injuries) remained the same.

A comparison of wildlife type crashes before and after the double wildlife (cattle) guard barrier improvement was installed showed that there was an increase in injury crashes (from 1 INJ in 5 years before to 2 INJ in the 5 years after). The number of PDO crashes was reduced from 19 to 12. The ratio of benefits and cost for this project shows that benefits are outweighed by costs as the B/C ratio is 0.24 to one. The result is an improvement that might not have been justified from an economic standpoint since the decrease in the number of PDO crashes is outweighed by the unfortunate increase in injury crashes, although the total number of wildlife crashes did decrease.

Results of Safety Analyses

Using Vision Zero Suite, the review of before and after crash records shows a decrease in the number of crashes; the total number of crashes decrease from 44 during the five-year period (2002 to 2006) before the wildlife barrier project was constructed (see **Table 1** and **Exhibit 1**) to 28 during the five-year after period (2009 to 2013) (see **Table 1** and **Exhibit 2**). The number of serious crashes showed a decrease in that there was no fatality during the after period:

- Before (2002 – 2006) – 1 fatal crash with 1 fatality (sideswipe opposite) and 9 injury crashes with 13 injuries
- After (2009 – 2013) – no fatal crashes and 9 injury crashes with 13 injuries

This decrease in the total number of crashes occurred in spite of a modest increase in traffic volumes on US 550: 6,500 vehicles per day (vpd) for the before period and 7,140 vpd in the after period reflected by the SPF analysis.

Table 1 - Results of Overall Crash Analyses

SH 550 MP 107 - 111	Before	After
Time Period:	1/1/2002 to 12/31/2006 (5 yr.)	1/1/2009 to 12/31/2013 (5 yr.)
AADT	6,488 vpd	7,140 vpd
Filters:	None	None
Total Crashes	**44**	**28**
Fatal Crashes (Fatalities)	1 (1)	0
Injury Crashes (Injuries)	9 (13)	9 (13)
Property Damage Only	34	19
Crash Types: # (%) [significance]		
Wild Animal	19 (43.2%) [99.96]	14 (50.0%) [99.26%]
Fixed Objects	10 (22.7%) [97.02%]	8 (28.6%)
Overturning	5 (11.4%)	1 (3.6%)
Rear End	3 (6.8%)	2 (7.1%)
Sideswipe Same	3 (6.8%)	1 (3.6%)
Sideswipe Opposite	2 (4.5%)	0
Fixed Object Crashes: # (% of FO) [significance]		
Fence	4 (40.0%)	0
Tree	4 (40.0%)	2 (25.0%)
Sign	1 (10.0%)	1 (12.5%)
Large Boulder/Rock	1 (10.0%)	3 (37.5%)
Embankment	0	2 (25.0%)

The magnitude of safety problems on select highway sections and intersections can be assessed thought the use of Safety Performance Function (SPF) methodology. A SPF reflects the complex relationship between exposure (measured in ADT) and the crash count for a section of roadway measured in crashes per mile per year (CPMPY) or for an intersection, measured in crashes per year. The SPF models provide an estimate for the expected crash frequency and severity for a range of ADT among similar facilities. This allows for an assessment of the magnitude of the safety problem from a frequency standpoint.

Development of the SPF lends itself well to the conceptual formulation of the Levels of Service of Safety (LOSS). The concept of level of service uses 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 represents a normal or expected number of crashes at a specific level of ADT, then the degree of deviation from the normal can be stratified to represent specific levels of safety.

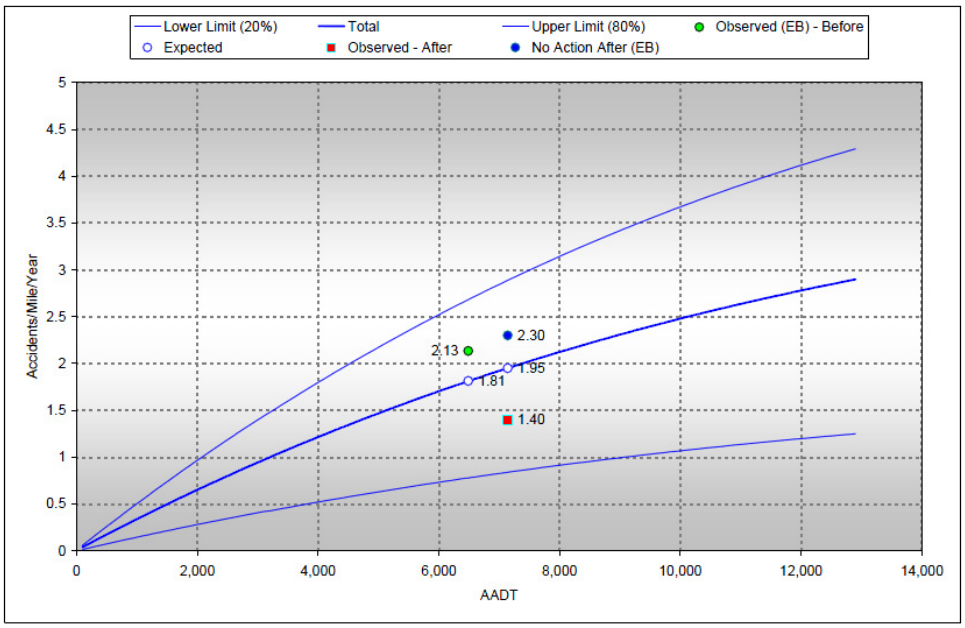
LOSS-I – Indicates low potential for crash reduction
LOSS-II – Indicates low to moderate potential for crash reduction
LOSS-III – Indicates moderate to high potential for crash reduction
LOSS-IV – Indicates high potential for crash reduction

LOSS boundaries are calibrated by computing the 20^{th} and the 80^{th} percentiles using the Gamma Distribution Probability Density Function. Gradual change in the degree of deviation of the LOSS boundary line from the fitted model mean reflects the observed increase of variability in crashes as ADT increases. LOSS reflects how a segment of roadway or intersection is performing in regard to its expected crash frequency at a specific level of ADT.

SPF plots for both total crashes (see **Figure 1**) and for fatal and injury crashes (see **Figure 2**) also reflect this improvement in the crash record. LOSS improved from the LOSS III range for total crashes in the before period to LOSS II in the after period. Injury/Fatal crashes improved in the after period, although still within the LOSS II range (see **Table 2**), due to the absence of a fatal crash. However, it is difficult to conclude that the overall decrease in almost all types of crashes (except wildlife) can be attributed solely to the installation of the double wildlife (cattle) guard at the main park entrance. **Figures 1** and **2** also show that the number of crashes during the period after construction was much improved in comparison to what it could have been without the project.

Figure 1 - SPF for Total Crashes

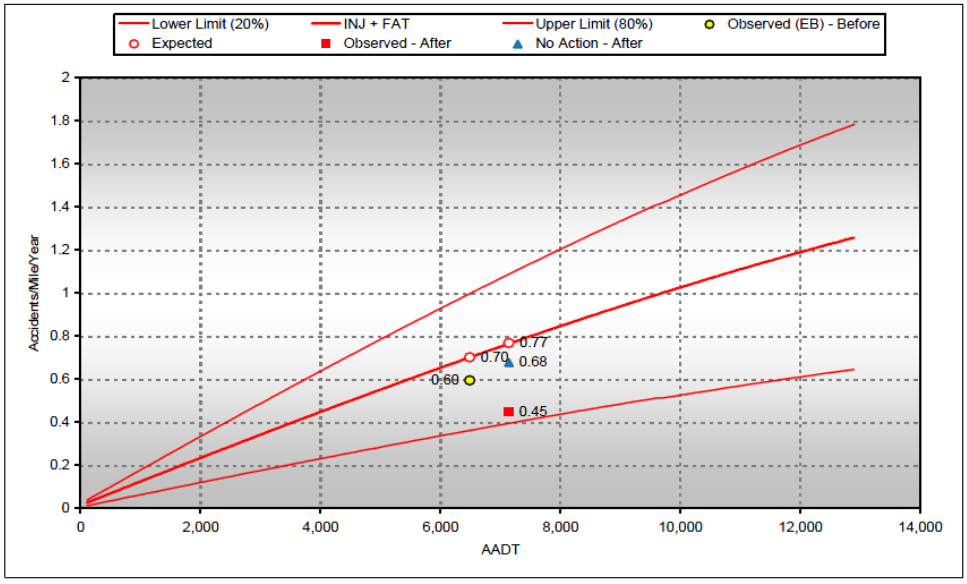
US 550 (MP 107 to MP 111)
Before: 2002 to 2006 After: 2009 to 2013



Note: Safety Performance Function (SPF) Model: Colorado - Rural Flat and Rolling 2-Lane Undivided Highway

Figure 2 - SPF for Injury and Fatal Crashes

US 550 (MP 107 to MP 111)
Before: 2002 to 2006 After: 2009 to 2013



Note: Safety Performance Function (SPF) Model: Colorado - Urban Flat Rolling Mountainous 4-Lane Divided Freeways (Revised)

Table 2 – Safety Performance Function (SPF)

SH 550 MP 107 - 111	Before	After	No Build After
EB Correction:	Yes	No	Yes
SPF Graph	Rural, Flat & Rolling, 2-lane Undivided Highway	Rural, Flat & Rolling, 2-lane Undivided Highway	Rural, Flat & Rolling, 2-lane Undivided Highway
Total Crashes:			
LOSS	LOSS III	LOSS II	LOSS II
CPMPY	2.13	1.40	2.30
Mean CPMPY	1.81	1.95	1.95
Proportion of Mean	1.177	0.718	1.177
Fatal & Injury Crashes:			
LOSS	LOSS II	LOSS II	LOSS II
CPMPY	0.60	0.45	0.68
Mean CPMPY	0.70	0.77	0.77
Proportion of Mean	0.857	0.584	0.857

A more detailed review of the before and after crash record reveals that a somewhat mixed improvement in safety can be attributed to the installation of the double wildlife (cattle) guard. **Table 3** provides a comparison of the wildlife type crash that is most directly affected by the new guard installation. The No Build After crashes were estimated using the increase in the median of the SPF for total crashes found in **Table 2** (increase is 1.077 = 1.95/1.81). **Table 3** shows an increase in injury crashes (from 1 in 5 years before to 2 in the 5 years after). The number of PDO crashes was reduced from 19 to 12.

Table 3 – Results of Wildlife Crash Analyses

SH 550 MP 107 - 111	Before	After	No Build After
Time Period:	1/1/2002 to 12/31/2006 (5 yr.)	1/1/2009 to 12/31/2013 (5 yr.)	1/1/2009 to 12/31/2013 (5 yr.)
Crash Types:			
Wildlife – Total	**19**	**14**	**20**
Injury (injuries)	1 (1)	2 (2)	1 (1)
PDO	18	12	19
% Reduction in Total			

Vision Zero Suite includes benefit/cost (B/C) analyses within its procedures. The results of the B/C analysis are shown in **Exhibit 3** for wildlife type crashes. The increase in injury crashes in the after period was factored into the analysis by increasing the cost of construction for the wildlife (cattle) guard. Over the design life of 10 years for the guard, the increased cost of crashes would be $161,400 (2 INJ = 2X$80,700). **Exhibit 3** shows the result of the Benefit/Cost calculation is a B/C ratio of 0.24. This result shows that the project might not have been justified from an economic standpoint since the decrease in the number of PDO crashes is outweighed by the unfortunate increase in injury crashes, although the total number of wildlife crashes did decrease.

Exhibit 3 – Benefit Cost Analysis – Wildlife Crashes Only

Colorado Department of Transportation
DiExSys™ Roadway Safety Systems
Economic Analysis Report

06/24/2015

Job #: 20150624075513

Location: 550B **Begin:** 107.00 **End:** 111.00 **From:** 01/01/2002 **To:** 12/31/2006

Benefit Cost Ratio Calculations

	Accidents		Projected Accidents and Reduction Factors			Other Information	
PDO:	19		Weighted PDO:	4.17	37% :ARF for PDO	Cost of PDO:	$ 9,300
INJ:	1	1 :Injured	Weighted INJ:	0.22	0% :ARF for INJ	Cost of INJ:	$ 80,700
FAT:	0	0 :Killed	Weighted FAT:	0.00	100% :ARF for FAT	Cost of FAT:	$ 1,500,000
			B/C Weighted Year Factor:	5.00	35% :Weighted ARF	Interest Rate:	5%
						ADT Growth Factor:	2.0%
						Service Life:	10
						Capital Recovery Factor:	0.129
						Annual Maintenance Cost:	$ 500

Cost: $ 456,555
From: 01/01/2009
To: 12/31/2013 Days: 1826

Benefit Cost Ratio: 0.24 (B/C Based on Injury Numbers : PDO/Injured/Killed)

Type of Improvement: Wildlife Crashes only
Special Notes: Latest NSC Crash Costs - Cost of 2 INJ ($80,700X2) over 10 yrs. added $161,400 to const. cost

Colorado Department of Transportation
DiExSys™ Roadway Safety Systems
Detailed Summary of Crashes Report

Exhibit 1

06/23/2015

Job #: 20150623104540

Location: 550B **Begin:** 107.00 **End:** 111.00 **From:** 01/01/2002 **To:** 12/31/2006

No Filters

Severity

PDO:	34	
INJ:	9	13 :Injured
FAT:	1	1 :Killed
Total:	**44**	

Number of Vehicles

One Vehicle:	34
Two Vehicles:	8
Three or More:	2
Unknown:	0
Total:	**44**

Location

On Road:	30
Off Road Left:	5
Off Road Right:	9
Off Road at Tee:	0
Off in Median:	0
Unknown:	0
Total:	**44**

Lighting Conditions

Daylight:	22
Dawn or Dusk:	5
Dark - Lighted:	0
Dark - Unlighted:	16
Unknown:	1
Total:	**44**

Weather Conditions

None:	36
Rain:	2
Snow/Sleet/Hail:	5
Fog:	0
Dust:	0
Wind:	0
Unknown:	1
Total:	**44**

Crash Rates

PDO:	0.72 *	* MVMT
INJ:	0.19 *	** 100 MVMT
FAT:	2.12 **	**Total:** **0.93** *

Crash Type

Overturning:	5	Bridge Abutment:	0
Other Non Collision:	1	Column/Pier:	0
Pedestrians:	0	Culvert/Headwall:	0
Broadside:	0	Embankment:	0
Head On:	0	Curb:	0
Rear End:	3	Delineator Post:	0
Sideswipe (Same):	3	Fence:	4
Sideswipe (Opposite):	2	Tree:	4
Approach Turn:	1	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:	19	Rocks in Roadway:	0
Light/Utility Pole:	0	Vehicle Cargo/Debris:	0
Traffic Signal Pole:	0	Road Maintenance Equipment:	0
Sign:	1	Involving Other Object:	0
Bridge Rail:	0	Total Other Objects:	0
Guard Rail:	0	Unknown:	0
Cable Rail:	0	**Total:**	**44**
Concrete Barrier:	0		

Mainline/Ramps/Frontage Roads

Mainline:	44
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:	**44**

Road Description

At Intersection:	3
At Driveway Access:	0
Intersection Related:	0
Non Intersection:	41
In Alley:	0
Roundabout:	0
Ramp:	0
Parking Lot:	0
Unknown:	0
Total:	**44**

Road Conditions

Dry:	32
Wet:	2
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:	1
Total:	**44**

ADT: 6,488 **Length:** 3.97

Colorado Department of Transportation
DiExSys™ Roadway Safety Systems
Detailed Summary of Crashes Report

Job #: 20150623104540

Location: 550B **Begin:** 107.00 **End:** 111.00 **From:** 01/01/2002 **To:** 12/31/2006

No Filters

Vehicle Type	Veh 1	Veh 2	Veh 3
Passenger Car/Van:	23	6	2
Passenger Car/Van w/Trl:	0	0	0
Pickup Truck/Utility Van:	14	1	0
Pickup Truck/Utility Van w/Trl:	2	1	0
SUV:	0	0	0
SUV w/Trl:	0	0	0
Truck 10k lbs or Less:	0	0	0
Trucks > 10k lbs/Bus > 15 People:	2	2	0
School Bus < 15 People:	0	0	0
Non School Bus < 15 People:	0	0	0
Motorhome:	1	0	0
Motorcycle:	2	0	0
Bicycle:	0	0	0
Motorized Bicycle:	0	0	0
Farm Equipment:	0	0	0
Hit and Run - Unknown:	0	0	0
Other:	0	0	0
Unknown:	0	0	0
Total:	**44**	**10**	**2**

Vehicle Movement	Veh 1	Veh 2	Veh 3
Going Straight:	37	6	1
Slowing:	2	1	0
Stopped in Traffic:	0	2	1
Making Right Turn:	0	0	0
Making Left Turn:	1	0	0
Making U-Turn:	0	0	0
Passing:	3	1	0
Backing:	0	0	0
Enter/Leave Parked Position:	0	0	0
Starting in Traffic:	0	0	0
Parked:	0	0	0
Changing Lanes:	1	0	0
Avoiding Object/Veh in Road:	0	0	0
Weaving:	0	0	0
Other:	0	0	0
Unknown:	0	0	0
Total:	**44**	**10**	**2**

Contributing Factor	Veh 1	Veh 2	Veh 3
No Apparent Contributing Factor:	35	10	2
Asleep at the Wheel:	1	0	0
Illness:	0	0	0
Distracted by Passenger:	0	0	0
Driver Inexperience:	3	0	0
Driver Fatigue:	0	0	0
Driver Preoccupied:	3	0	0
Driver Unfamilar with Area:	2	0	0
Driver Emotionally Upset:	0	0	0
Evading Law Enforcement Officier:	0	0	0
Physical Disability:	0	0	0
Unknown:	0	0	0
Total:	**44**	**10**	**2**

Direction	Veh 1	Veh 2	Veh 3
North:	0	0	0
Northeast:	0	0	0
East:	19	6	1
Southeast:	0	0	0
South:	3	0	0
Southwest:	0	0	0
West:	22	4	1
Northwest:	0	0	0
Unknown:	0	0	0
Total:	**44**	**10**	**2**

Condition of Driver	Veh 1	Veh 2	Veh 3
No Impairment Suspected:	43	10	2
Alcohol Involved:	0	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:	0	0	0
Total:	**44**	**10**	**2**

ADT: 6,488 **Length:** 3.97

Colorado Department of Transportation
DiExSys™ Roadway Safety Systems
Detailed Summary of Crashes Report

Exhibit 2

06/23/2015

Job #: 20150623105149

Location: 550B **Begin:** 107.00 **End:** 111.00 **From:** 01/01/2009 **To:** 12/31/2013

No Filters

Severity

PDO:	19	
INJ:	9	13 :Injured
FAT:	0	0 :Killed
Total:	**28**	

Number of Vehicles

One Vehicle:	23
Two Vehicles:	5
Three or More:	0
Unknown:	0
Total:	**28**

Location

On Road:	19
Off Road Left:	5
Off Road Right:	4
Off Road at Tee:	0
Off in Median:	0
Unknown:	0
Total:	**28**

Lighting Conditions

Daylight:	17
Dawn or Dusk:	1
Dark - Lighted:	0
Dark - Unlighted:	10
Unknown:	0
Total:	**28**

Weather Conditions

None:	20
Rain:	1
Snow/Sleet/Hail:	7
Fog:	0
Dust:	0
Wind:	0
Unknown:	0
Total:	**28**

Crash Rates

PDO:	0.36 *	* MVMT
INJ:	0.17 *	** 100 MVMT
FAT:	0.00 **	**Total:** **0.54** *

Crash Type

Overturning:	1	Bridge Abutment:	0
Other Non Collision:	0	Column/Pier:	0
Pedestrians:	0	Culvert/Headwall:	0
Broadside:	0	Embankment:	2
Head On:	1	Curb:	0
Rear End:	2	Delineator Post:	0
Sideswipe (Same):	1	Fence:	0
Sideswipe (Opposite):	0	Tree:	2
Approach Turn:	0	Large Boulders or Rocks:	3
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:	8
Wild Animal:	14	Rocks in Roadway:	0
Light/Utility Pole:	0	Vehicle Cargo/Debris:	1
Traffic Signal Pole:	0	Road Maintenance Equipment:	0
Sign:	1	Involving Other Object:	0
Bridge Rail:	0	Total Other Objects:	1
Guard Rail:	0	Unknown:	0
Cable Rail:	0	**Total:**	**28**
Concrete Barrier:	0		

Mainline/Ramps/Frontage Roads

Mainline:	28
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:	**28**

Road Description

At Intersection:	0
At Driveway Access:	0
Intersection Related:	0
Non Intersection:	28
In Alley:	0
Roundabout:	0
Ramp:	0
Parking Lot:	0
Unknown:	0
Total:	**28**

Road Conditions

Dry:	20
Wet:	2
Muddy:	0
Snowy:	6
Icy:	0
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:	**28**

ADT: 7,140 **Length:** 3.99

Colorado Department of Transportation
DiExSys™ Roadway Safety Systems
Detailed Summary of Crashes Report

Job #: 20150623105149

Location: 550B **Begin:** 107.00 **End:** 111.00 **From:** 01/01/2009 **To:** 12/31/2013

No Filters

Vehicle Type	Veh 1	Veh 2	Veh 3
Passenger Car/Van:	9	1	0
Passenger Car/Van w/Trl:	0	0	0
Pickup Truck/Utility Van:	12	1	0
Pickup Truck/Utility Van w/Trl:	0	0	0
SUV:	6	3	0
SUV w/Trl:	0	0	0
Truck 10k lbs or Less:	0	0	0
Trucks > 10k lbs/Bus > 15 People:	0	0	0
School Bus < 15 People:	0	0	0
Non School Bus < 15 People:	0	0	0
Motorhome:	0	0	0
Motorcycle:	1	0	0
Bicycle:	0	0	0
Motorized Bicycle:	0	0	0
Farm Equipment:	0	0	0
Hit and Run - Unknown:	0	0	0
Other:	0	0	0
Unknown:	0	0	0
Total:	**28**	**5**	**0**

Vehicle Movement	Veh 1	Veh 2	Veh 3
Going Straight:	22	4	0
Slowing:	0	0	0
Stopped in Traffic:	0	1	0
Making Right Turn:	0	0	0
Making Left Turn:	0	0	0
Making U-Turn:	0	0	0
Passing:	2	0	0
Backing:	1	0	0
Enter/Leave Parked Position:	0	0	0
Starting in Traffic:	0	0	0
Parked:	0	0	0
Changing Lanes:	0	0	0
Avoiding Object/Veh in Road:	0	0	0
Weaving:	0	0	0
Other:	3	0	0
Unknown:	0	0	0
Total:	**28**	**5**	**0**

Contributing Factor	Veh 1	Veh 2	Veh 3
No Apparent Contributing Factor:	23	5	0
Asleep at the Wheel:	1	0	0
Illness:	0	0	0
Distracted by Passenger:	1	0	0
Driver Inexperience:	1	0	0
Driver Fatigue:	1	0	0
Driver Preoccupied:	0	0	0
Driver Unfamilar with Area:	0	0	0
Driver Emotionally Upset:	0	0	0
Evading Law Enforcement Officier:	0	0	0
Physical Disability:	0	0	0
Unknown:	1	0	0
Total:	**28**	**5**	**0**

Direction	Veh 1	Veh 2	Veh 3
North:	6	1	0
Northeast:	1	0	0
East:	10	2	0
Southeast:	0	0	0
South:	4	1	0
Southwest:	0	0	0
West:	7	1	0
Northwest:	0	0	0
Unknown:	0	0	0
Total:	**28**	**5**	**0**

Condition of Driver	Veh 1	Veh 2	Veh 3
No Impairment Suspected:	26	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:	1	0	0
Driver/Pedestrian not Observed:	0	0	0
Unknown:	0	0	0
Total:	**28**	**5**	**0**

ADT: 7,140 **Length:** 3.99

User: Hattan on PLAN11

Project Information

Project Name: SH 83A (Parker Road) from Lehigh Avenue to I-225A

Project Description: Install Concrete Median Barrier

CDOT Region: 6 Project Def: 15645 County: Arapahoe

Location: SH 83A Mile Points: from 69.39 to 70.57 Length: 1.18 miles

Schedule: Work Start Date: 9/11/2006 Completion Date: 1/17/2007

Problem Description: As described in the Highway Safety Improvement Program (HSIP) application for this project, the five-year crash history (2000 – 2004) showed a number of head-on, sideswipe in opposite direction, median crossover, and off median/left type crashes. The number of head-on crashes (9) was higher than expected. These crashes occurred with a high severity (1 fatal and 10 injury crashes).

Improvement Description: Between September 11, 2006 and January 17, 2007, a concrete median barrier (1.18 miles) was constructed between the intersection at Lehigh Avenue and the intersection at I-225. (There may have been short segments of concrete median barrier in place before this project). This barrier was installed to reduce the potential for head-on and sideswipe (opposite direction) crashes. The cost of construction was $1,320,726.

The HSIP application anticipated that the following reductions in crashes might be realized by the improvement anticipated: fatal crashes – 60%, injury crashes – 40%, and property damage only – 0%. The initial benefit/cost ratio was estimated to be 2.21.

Summary and Findings

The analysis of safety before and after the concrete median barrier was installed along SH 83A between Lehigh Avenue and I-225 showed reductions in the types of crashes that a median barrier is designed to mitigate. For this segment of limited access highway, there were 229 total crashes (mainline, non-intersection) during the five-year period before the concrete barrier was installed (2001 – 2005). In the five years after construction (2008 – 2012), the number of crashes increased slightly to 240. Since daily volumes continued to increase throughout the study period, the crash rate was reduced. In addition, the number of injury and fatal crashes also diminished.

The concrete median barrier improvement was directly responsible for decreases in the number and severity of head-on, overturning and sideswipe (opposite) crashes. During the before period, there was one fatal head-on collision and two injury crashes that involved injuries to 4 people. The after period experienced no fatal or injury crashes of these three types. The number of crashes involving the concrete median barrier remained the same in the before and after periods, although the number of injury crashes was reduced.

The ratio of benefits derived from crash reduction to the cost of construction for this project shows that benefits outweigh costs by a ratio of 5.91 to one. The result is an improvement that was certainly justified, especially since there were no fatal crashes in the period after construction.

Results of Safety Analyses

Using Vision Zero Suite, the review of before and after crash records shows a slight increase in the number of crashes; the total number of crashes increased from 229 during the five-year period (2001 to 2005) before the concrete median barrier project was constructed (see **Table 1** and **Exhibit 1**) to 240 during the five-year after period (2008 to 2012) (see **Table 1** and **Exhibit 2**). As identified in **Table 1**, these crashes were not at either of the intersections in the study area and involved the mainline of SH 83A only. The number of serious crashes showed a more significant decrease:

- Before (2001 – 2005) – 2 fatal crashes with 2 fatalities (1 head-on and 1 involving a pedestrian) and 74 injury crashes with 98 injuries
- After (2008 – 2012) – no fatal crashes and 68 injury crashes with 90 injuries

This decrease in severe crashes occurred in spite of a modest increase in traffic volumes on SH 83A: 68,600 vehicles per day (vpd) estimated for the before period and 73,750 vpd in the after period. This combination of increased traffic and decreased number of crashes also resulted in a decrease in the accident rates:

- Before (2001 – 2005): 1.55 crashes per million vehicle miles of travel (cpmvmt)
- After (2008 – 2012): 1.49 (cpmvmt)

Table 1 – SH 83A (MP 69.39 to MP 70.57) - Results of Overall Crash Analyses

	Before	After
Time Period:	1/1/2001 to 12/31/2005 (5 yr.)	1/1/2008 to 12/31/2012 (5 yr.)
AADT	68,579 vpd	73,749vpd
Filters:	Non-Intersection / Mainline Only	Non-Intersection / Mainline Only
Total Crashes	**229**	**240**
Fatal Crashes (Fatalities)	2(2)	0
Injury Crashes (Injuries)	74 (98)	68 (90)
Property Damage Only	153	172
Crash Types: # (%)		
Rear End	122 (53.3%)	156 (65.0%)
Sideswipe Same	45 (19.7%)	43 (25.3%)
Fixed Objects	37 (16.2%)	27 (11.2%)
Head-On	6 (2.6%)	0
Overturning	2(0.9%)	3 (1.2%)
Sideswipe Opposite	4 (1.7%)	0
Other Objects	3(1.3%)	5 (2.0%)
Fixed Object Crashes: # (% of FO)		
Concrete Barrier	7 (18.9%)	16 (59.6%)
Guard Rail	16 (43.2%)	4 (14.8%)
Curb	3 (8.1%)	0
Crash Cushion	3 (8.1%)	2 (7.4%)
Tree	1 (2.7%)	2 (7.4%)

J. Arizona
    1. Flow chart of local program HSIP approval

Local Highway Safety Improvement Program (HSIP)
Eligibility Process
SFY17

ADOT LPA Program Manager makes a Call to the MPO/COG **February 3, 2016** for HSIP Local Projects

Local Agency submits potential Local HSIP Project applications to MPO/COG Based on most recent 5 years of crash data in ADOT DB

MPO/COG ranks potential HSIP Projects and submits to ADOT LPA Program Manager **DEADLINE** for Applications to ADOT **May 1, 2016** (**Project placed in TIP Parking Lot**)

ADOT LPA Program Manager sends application to HSIP Manager in ADOT TSS, Senior PM in ADOT PMG, for ***Eligibility** (PMG assign PM)

PMG review scope, schedule and budget within two weeks of receipt

PMG and TSS will work together on scope schedule and budget

Project qualify for HSIP Eligibility?

YES

HSIP Manager:
issues approved letter of eligibility and
generates prioritized list of projects

Latest August 1, 2016

NO

ADOT TSS will notify LPA, LPAS, MPO/COG, PMG, LPA Program Manager, MPD Planner

HSIP Project Manager sends prioritized list of projects to MPD for P2P process

Date Pending

ADOT TSS notifies FHWA, LPAS, LPA, COG/MPO, PMG, MPD Planner, and ADOT District of Eligibility

ADOT MPD notifies TSS and LPASf which projects are approved for HSSIP funding

Date Pending

LPAS requests Project Initiation Letter and works with MPO/COG moves Eligible HSIP project from parking lot to TIP and submits STIP for approval

SWPM/UPM PM:
A. requests ADOT Project No/ Federal No
B. provides to HSIP Manager and LPA Program Manager
C. Initiates IGA/JPA request
Deadline for executed IGA
January 31, 2017

HSIP Manager will notify FHWA of the ADOT Project No/Federal No

HSIP Manager:
issues a **revised** approved letter of eligibility and notifies FHWA, LPAS, LPA, COG/MPO, PMG, MPD Planner, and ADOT District of Eligibility

Submission to ADOT Finance of all documentation and clearances required for authorization
Latest March 1, 2017

ADOT Obtains Federal Authorization for Design

Latest June 30, 2017

Projects inactive for over a year will have funds deobligated.

30 months from design authorization

PM Initiates Design (Kick-Off Meeting)

Latest August 14, 2017

Change in scope, project limits or cost increases by 20% or more?

YES

LPA prepares and submits a modified application for revised HSIP eligibility

NO

PM Initiates Construction

Latest Dec 31, 2019

KEY

COG	Council of Governments
FHWA	Federal Highway Administration
HSIP	Highway Safety Improvement Program
LPA	Local Public Agency
LPAS	Local Public Agency Section
MPO	Metropolitan Planning Organizations
MPD	Multimodal Planning Division
P2P	Planning to Programming Process
PMG	Project Management Group
TSS	Traffic Safety Section

NOTE: Eligibility Requirements

***** Most recent 5 years of crash data must influence safety countermeasure.

Eligibility from ADOT does not give you "authorization" to begin work on a project. Eligibility just means that the project qualifies for HSIP (safety) funding.

A revised Eligibility Letter is required from ADOT TSS for the following reasons:

1.) Outside the original Project Limits
2.) Scope of Work changes
3.) Above 20% of the original total project estimate or $1m (FHWA change order required)

No Design and Construction/Procurement in the same SFY.