

## Appendix A: Abbreviations and Acronyms

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AAA	American Automobile Association	NATEO	Northwest Association of Tribal Enforcement Officers
AASHTO	American Association of State Highway and Transportation Officials	NASCIO	National Association of State Chief Information Officers
BAC	Blood Alcohol Concentration	NCHRP	National Cooperative Highway Research Program
BIA	Bureau of Indian Affairs	NHTSA	National Highway Traffic Safety Administration
CEDDS	Coded Emergency Department Data Information System	NTSBE	Nighttime Seat Belt Project Enforcement
CHARS	Comprehensive Hospital Abstract Reporting System	OTEP	Ongoing Training and Evaluation Programs
CIOT	Click It or Ticket	PSA	Public Service Announcement
CLAS	Collision Locations and Analysis System	PTCR	Police Traffic Collision Report
CMV	Commercial Motor Vehicle	SAFETEA-LU	Safe, Accountable, Flexible, Efficient, Transportation Equity Act – A legacy for Users
CVSA	Commercial Vehicle Safety Alliance	SECTOR	Statewide Electronic Collision and Ticket Online Records
DEC	Drug Evaluation and Drug Detection	SFST	Statewide Field Sobriety Test
DJS	Driver Training School	SHSP	Strategic Highway Safety Plan
DOL	WA State Department of Licensing	TACT	Ticketing Aggressive Cars and Trucks
DRE	Drug Recognition Expert	TRB	Transportation Research Board
DSHS	Washington State Department of Social and Health Services	TRC	Traffic Records Committee
DTS	Driver Training School	USDOT	United States Department of Transportation
DUI	Driving Under the Influence (alcohol/ drugs)	VMT	Vehicle Miles Traveled
DWI	Driving While Intoxicated	WAC	Washington Administrative Code
EDRS	Electronic Death Registration System	Wa-Trans	Washington State Transportation Framework
EMS	Emergency Medical Services	WEMSYS	Washington Emergency Medical Services Information System
EMSTC	Emergency Medical Services and Trauma Care	WSDOT	Washington State Department of Transportation
e-TRIP	Electronic Traffic Information Processing	WSP	Washington State Patrol
FARS	Fatality Analysis Reporting System	WSSRC	Washington State Safety Restraint Coalition
FHWA	Federal Highway Administration	WTSC	Washington Traffic Safety Commission
GIS	Geographic Information Systems		
GMAP	Government Management Accountability and Performance		
GPS	Global Positioning System		
IDL	Intermediate Drivers License		
JINDEX	Justice Information Network Data Exchange		
JIS	Judicial Information System		

## Appendix B: Definitions

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### **Alcohol-impaired driver**

Any driver with a BAC of .08 or higher.

### **Blood Alcohol Concentration**

The BAC is measured as a percentage by weight of alcohol in the blood (grams/deciliter). A positive BAC level (0.01 g/dl and higher) indicates that alcohol was consumed by the person tested. A BAC level of 0.08 g/dl or more indicates that the person was intoxicated.

### **Collision**

An unintended event that causes a death, injury or property damage and involves at least one motor vehicle or pedalcyclist on a public roadway.

### **Contributing Circumstance**

An element or driving action that, in the reporting officer's opinion, best describes the main cause of the collision. First, second and third contributing causes are collected for each motor vehicle driver, pedalcyclist and pedestrian involved in the collision.

### **Corridor Safety Model**

The Corridor Safety Program engages communities in custom-designing their own action plan to reduce the number and severity of automobile crashes. It focuses on stretches of highway that have been identified as having the highest accident and fatality rates. The program uses low-cost engineering fixes and strong local partnerships to develop plans that include elements of education, enforcement, emergency services and engineering. Interested citizens along with businesses and agencies that have a vested interest in the safety of their roadways locally coordinate the program in each community.

### **Serious Injury**

Any injury other than a fatal injury that prevents the injured person from walking, driving, or normally continuing the activities the person was capable of performing before the injury occurred.

### **Drinking driver**

Any driver with a positive BAC or a police report of "had been drinking impaired," "had been drinking not impaired" or "had been drinking impairment unknown."

### **Electronic Traffic Information Processing (eTRIP) Initiative**

A collaborative effort among State and local agencies to create a seamless and integrated system through which traffic-related information can travel from its point of origin to its end use and analysis. The heart of this undertaking is to move from the current paper-based process to an automated system that will enable law enforcement agencies to electronically create tickets and collision reports in the field and transmit this data to State repositories and authorized users.

### **Fatality**

A person who died within 30 days of a collision as a result of injuries sustained in the collision.

### **Fatality Analysis Reporting System (FARS)**

Contains data on a census of fatal traffic crashes within the 50 States, the District of Columbia, and Puerto Rico. To be included in FARS, a crash must involve a motor vehicle traveling on a trafficway customarily open to the public and result in the death of a person (occupant of a vehicle or a non-occupant) within 30 days of the crash. FARS collects information on over 100 different coded data elements that characterizes the crash, the vehicle, and the people involved. More information is available on page 85.

### **Fatality Rate**

Number of deaths resulting from reportable collisions for a specified segment of public roadway per 100 million vehicle miles of travel or per 100,000 people.

### **Government Management, Accountability and Performance System (GMAP)**

Data-driven management and performance systems designed to measure the effectiveness of how State services are delivered and whether or not the results that are intended were accomplished.

[www.accountability.wa.gov/](http://www.accountability.wa.gov/)

## Appendix B: Definitions

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### **Impaired driver**

Any driver with a BAC of .08 or greater and/or any driver with a positive result on a drug test.

### **Impairment related collision**

Any driver, pedestrian, cyclists, etc with a BAC of .08 or greater and/or a positive result on a drug test.

### **Licensed Driver**

A person who is licensed by any State, province or other governmental entity to operate a motor vehicle on public roadways.

### **Motor Vehicle**

Any motorized device in, upon or by which any person or property is or may be transported or drawn upon a public roadway, excepting devices used exclusively upon stationary rails or tracks. This includes every motorized vehicle that is self-propelled or propelled by electric power (excluding motorized wheel-chairs), including that obtained from overhead trolley wires but not operated on rails.

### **Nonmotorist**

Any person who is not an occupant of a motor vehicle in transport and includes the following: 1. Pedestrians 2. Bicyclists, tricyclists, and unicyclists 3. Occupants of parked motor vehicles 4. Others such as joggers, skateboard riders, people riding on animals, and persons riding in animal-drawn conveyances.

### **Passenger**

Any occupant of a motor vehicle who is not a driver.

### **Pedestrian**

Any person not in or upon a motor vehicle or other vehicle.

### **Restraint**

A device such as a seat belt, shoulder belt, booster seat, or

child seat used to hold the occupant of a motor vehicle in the seat at all times while the vehicle is in motion.

### **Rural**

All areas, incorporated and unincorporated, with a population of less than 5,000.

### **Urban**

Any incorporated area with a population of over 5,000.

### **Vehicle Miles Traveled (VMT)**

The number of miles traveled annually by motor vehicles in the State of Washington (this figure is formulated by the Transportation Data Office of WSDOT). More information on page 85.

### **Work Zone**

Any activity involving construction, maintenance or utility work on or in the immediate vicinity of a public roadway. A work zone may be active (workers present) or inactive (workers not present).

## Appendix C: Additional Resources

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### Impairment

NCHRP Report 500, Volume 16: A Guide for Reducing Alcohol-Related Collisions. (2005)

[onlinepubs.trb.org/onlinepubs/nchrp/nchrp\\_rpt\\_500v16.pdf](http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_500v16.pdf)

National Highway Traffic Safety Administration, National Criminal Justice Association (NCJA), Criminal Justice Leadership Meeting, Traffic Safety Today, Final Report, December 2003.

[www.nhtsa.dot.gov/people/injury/enforce/TrafficSafetyToday/index.html](http://www.nhtsa.dot.gov/people/injury/enforce/TrafficSafetyToday/index.html)

System Improvements for Dealing with the Hard Core Drinking Driver, Traffic Injury Research Foundation.

National Traffic Safety Board, Most Wanted Transportation Safety Improvements, Eliminate Hard Core Drinking Driver.

[www.nts.gov/recs/mostwanted/hard\\_core\\_drinking.htm](http://www.nts.gov/recs/mostwanted/hard_core_drinking.htm)

National Highway Traffic Safety Administration, Strategies for Addressing the DWI Offender: 10 Promising Sentencing Practices. 2004

[www.nhtsa.gov/people/injury/enforce/PromisingSentence/pages/](http://www.nhtsa.gov/people/injury/enforce/PromisingSentence/pages/)

Countermeasures that Work, The Fifth Edition, A Highway Safety Countermeasure Guide for State Highway Safety Offices by the Governors Highway Safety Association for the National Highway Traffic Safety Administration and the U.S. Department of Transportation.

[www.nhtsa.gov/staticfiles/nti/enforcement/pdf/Countermeasures\\_HS811258.pdf](http://www.nhtsa.gov/staticfiles/nti/enforcement/pdf/Countermeasures_HS811258.pdf)

National Highway Traffic Safety Administration, Emergency Nurses Association, and American College of Emergency Physicians, Developing Best Practices of Emergency Care for the Alcohol-Impaired Patient. 2000

[www.nhtsa.gov/people/injury/alcohol/EmergCare/toc.htm](http://www.nhtsa.gov/people/injury/alcohol/EmergCare/toc.htm)

International Association of Chiefs of Police (IACP)

Highway Safety Committee, Impaired Driving Subcommittee, Impaired Driving Guidebook: Three Keys to Renewed Focus and Success. 2006

[www.wa.gov/wtsc/programs/impaired.htm](http://www.wa.gov/wtsc/programs/impaired.htm)

The Journal of Trauma, Injury Infection and Critical Care.

Alcohol and other drug problems among hospitalized trauma patients: Controlling complications, mortality and trauma recidivism. Vol. 59 No.3, September 2005. Entire issue addresses Screening and Brief Intervention.

Traffic Injury Research Foundation, 10 Steps to a Strategic Review of the DWI System: A Guidebook for Policymakers, 2007.

[64.26.129.106/DWI\\_systemImprovements/documents/TIRFBooklet\\_000.pdf](http://64.26.129.106/DWI_systemImprovements/documents/TIRFBooklet_000.pdf)

Strategies for Addressing the DWI Offender: 10 Promising Sentencing Practices, National Highway Traffic Safety Administration, DOT HS 809 850, March 2005,

[www.nhtsa.dot.gov/people/injury/enforce/PromisingSentence/pages/](http://www.nhtsa.dot.gov/people/injury/enforce/PromisingSentence/pages/)

### Speeding

National Highway Traffic Safety Administration, "Speed Management Strategic Initiative," September 2005, DOT HS 809 924.

[www.nhtsa.dot.gov/people/injury/enforce/SpeedManagementcontent/index.html](http://www.nhtsa.dot.gov/people/injury/enforce/SpeedManagementcontent/index.html)

NCHRP Report 500, Volume 23: A Guide for Reducing Speeding-Related Crashes

[onlinepubs.trb.org/onlinepubs/nchrp/nchrp\\_rpt\\_500v23.pdf](http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_500v23.pdf)

### Run-Off-the-Road Collision Resources

NCHRP Report 500, Volume 6, A Guide for Addressing Run-Off-Road Collisions, addresses many of these strategies in detail.

[safety.transportation.org/guides.aspx?cid=27](http://safety.transportation.org/guides.aspx?cid=27)

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NCHRP Report 500, Volume 3, A Guide for Addressing Trees in Hazardous Locations, addresses many of these strategies in detail. [safety.transportation.org/guides.aspx?cid=24](http://safety.transportation.org/guides.aspx?cid=24)

NCHRP Report 500, Volume 8, A Guide for Addressing Collisions Involving Utility Poles, addresses many of these strategies in detail. [safety.transportation.org/guides.aspx?cid=31](http://safety.transportation.org/guides.aspx?cid=31)

The American Traffic Safety Services Association, Low Cost Local Road Safety Solutions, addresses many of these strategies in detail. <http://www.atssa.com/galleries/defaultfile/LowCostLocalRoads.pdf>

### Young Driver Safety Resources

Countermeasures that Work, The Fifth Edition, A Highway Safety Countermeasure Guide for State Highway Safety Offices by the Governors Highway Safety Association for the National Highway Traffic Safety Administration and the U.S. Department of Transportation. [www.nhtsa.gov/staticfiles/nti/enforcement/pdf/Countermeasures\\_HS811258.pdf](http://www.nhtsa.gov/staticfiles/nti/enforcement/pdf/Countermeasures_HS811258.pdf)

Healthy States, Council of State Governments (CSG) Initiative, Graduated Driver Licensing Tool Kit, 2007. [www.healthystates.csg.org/NR/rdonlyres/72C6F412-47D3-4433-BA2A-3F72C0B4C885/0/gdltoolkit.pdf](http://www.healthystates.csg.org/NR/rdonlyres/72C6F412-47D3-4433-BA2A-3F72C0B4C885/0/gdltoolkit.pdf)

Centers For Disease Control and Prevention – Motor Vehicle Safety, Teen Driver Information [www.cdc.gov/Motorvehiclesafety/Teen\\_Drivers/index-fs.html](http://www.cdc.gov/Motorvehiclesafety/Teen_Drivers/index-fs.html)

Insurance Institute for Highway Safety [www.iihs.org/research/topics/teenagers.html](http://www.iihs.org/research/topics/teenagers.html)

Williams, A. F. (2003). Teenage drivers: patterns of risk. *Journal of Safety Research*, 34, 5-15.

Williams, A. F., Ferguson, S. A., & McCartt, A. T. (2007). Passenger effects on teenage driving and opportunities for reducing the risks of such travel. *Journal of Safety Research*, 38, 381-390.

### Unrestrained Vehicle Occupants

NCHRP Report 500, Volume 11: A Guide for Increasing Seat Belt Use. [safety.transportation.org/guides.aspx?cid=28](http://safety.transportation.org/guides.aspx?cid=28)

Countermeasures that Work, The Fifth Edition, A Highway Safety Countermeasure Guide for State Highway Safety Offices by the Governors Highway Safety Association for the National Highway Traffic Safety Administration and the U.S. Department of Transportation. [www.nhtsa.gov/staticfiles/nti/enforcement/pdf/Countermeasures\\_HS811258.pdf](http://www.nhtsa.gov/staticfiles/nti/enforcement/pdf/Countermeasures_HS811258.pdf)

National Center for Injury Prevention and Control. Community-Based Interventions to Reduce Motor Vehicle-Related Injuries: Evidence of Effectiveness from Systematic Reviews.

National Safe Kids Campaign, Report to the Nation: Trends in Unintentional Childhood Injury Mortality, 1987-2000 (May 2003)

[www.safekids.org/assets/docs/ourwork/research/research-report-safe-kids-week-2003.pdf](http://www.safekids.org/assets/docs/ourwork/research/research-report-safe-kids-week-2003.pdf)

RCW 46.61.687 (child car seat law)

RCW 46.61.688 (seat belt law)

### Distracted Driver Resources

NCHRP Report 500, Volume 14: A Guide for Reducing Crashes Involving Drowsy and Distracted Drivers. [onlinepubs.trb.org/onlinepubs/nchrp/nchrp\\_rpt\\_500v14.pdf](http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_500v14.pdf)

Countermeasures that Work, The Fifth Edition, A Highway Safety Countermeasure Guide for State Highway Safety Offices by the Governors Highway Safety Association for the National Highway Traffic Safety Administration

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and the U.S. Department of Transportation.

[www.nhtsa.gov/staticfiles/nti/enforcement/pdf/Countermeasures\\_HS811258.pdf](http://www.nhtsa.gov/staticfiles/nti/enforcement/pdf/Countermeasures_HS811258.pdf)

Caird, J. K., Scialfa, C. T., Ho, G., & Smiley, A. (2005). A meta-analysis of driving performance and crash risk associated with the use of cellular telephones while driving. In Proceedings of the third international driving symposium on human factors in driver assessment, training and vehicle design (pp. 478–485). The University of Iowa Public Policy Center.

CTIA – The Wireless Association. Wireless quick facts, 2009. Accessed April 9, 2010 at [www.ctia.org/advocacy/research/index.cfm/AID/10323](http://www.ctia.org/advocacy/research/index.cfm/AID/10323).

Jacobson, P.D., Gostin, L.O. Reducing Distracted Driving Regulation and Education to Avert Traffic Injuries and Fatalities. *JAMA*. 2010;303(14):1419-1420.

Klauer, S. G., Dingus, T. A., Neale, V. L., Sudweeks, J. D., & Ramsey, D. J. (2006). The impact of driver inattention on near-crash/crash risk: An analysis using the 100-car naturalistic driving study data. DOT HS 810 594. Washington, DC: National Highway Traffic Safety Administration.

NHTSA. (September 2009). Traffic safety facts, research note: Driver electronic device use in 2008. DOT HS 811 184.

Lenhart, Amanda. (2009) Teens and Mobile Phones Over that Past Five Years: Pew Internet Looks Back. Pew Research Center's Internet & American Life Project, Washington, DC.

[authoring.pewinternet.org/Reports/2009/14--Teens-and-Mobile-Phones-Data-Memo.aspx](http://authoring.pewinternet.org/Reports/2009/14--Teens-and-Mobile-Phones-Data-Memo.aspx)

### Unlicensed Driver Resources

NCHRP Report 500 Volume 2  
[safety.transportation.org/doc/1P%20Unlicensed%20Drivers.pdf](http://safety.transportation.org/doc/1P%20Unlicensed%20Drivers.pdf)

### Intersections Resources

NCHRP Report 500, Volume 12, A Guide for Addressing Collisions at Signalized Intersections, addresses many of these strategies in detail.

[safety.transportation.org/guides.aspx?cid=33](http://safety.transportation.org/guides.aspx?cid=33)

NCHRP Report 500, Volume 05, A Guide for Addressing Collisions at Unsignalized

Intersections, addresses many of these strategies in detail.  
[safety.transportation.org/guides.aspx?cid=26](http://safety.transportation.org/guides.aspx?cid=26)

### Data Systems Resources

National Highway Traffic Safety Administration, Traffic Records, A Highway Safety Program Advisory.  
[www.nhtsa.gov/people/performance/pdfs/Advisory.pdf](http://www.nhtsa.gov/people/performance/pdfs/Advisory.pdf)

National Highway Traffic Safety Administration, Initiatives to Address Improvements of Traffic Safety Data July 2004.

[www.nhtsa-tsis.net/workshops/pdfs/\\_Q\\_Data\\_IPT\\_Report.pdf](http://www.nhtsa-tsis.net/workshops/pdfs/_Q_Data_IPT_Report.pdf)

Washington Traffic Safety Commission, Washington Traffic Records Committee Resource Manual. July 2004.  
[www.trafficrecords.wa.gov/AboutTRC/Docs/trc\\_docs/traffic\\_records\\_resource\\_manual.pdf](http://www.trafficrecords.wa.gov/AboutTRC/Docs/trc_docs/traffic_records_resource_manual.pdf)

National Safety Council, A National Agenda for the Improvement of Highway Safety Information Systems. 1997.

MMUCC Guideline: Model Minimum Uniform Crash Criteria, 3rd Edition (2008).  
[www.mmucc.us/2008MMUCCGuideline.pdf](http://www.mmucc.us/2008MMUCCGuideline.pdf)

National Highway Traffic Safety Administration Technical Assessment Team. State of Washington Traffic Records Assessment. January 2004.

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Washington Traffic Records Strategic Plan. Available at:  
[www.trafficrecords.wa.gov/AboutTRC/Docs/trc\\_docs/traffic\\_records\\_strategic\\_plan.pdf](http://www.trafficrecords.wa.gov/AboutTRC/Docs/trc_docs/traffic_records_strategic_plan.pdf)

### Opposite-Direction Multi-Vehicle Collision Resources

NCHRP Report 500, Volume 4, A Guide for Addressing Head-On Collisions, discusses many of these strategies in detail.

[safety.transportation.org/guides.aspx?cid=25](http://safety.transportation.org/guides.aspx?cid=25)

### Motorcycle Safety Resources

Countermeasures that Work, The Fifth Edition, A Highway Safety Countermeasure Guide for State Highway Safety Offices by the Governors Highway Safety Association for the National Highway Traffic Safety Administration and the U.S. Department of Transportation.

[www.nhtsa.gov/staticfiles/nti/enforcement/pdf/Countermeasures\\_HS811258.pdf](http://www.nhtsa.gov/staticfiles/nti/enforcement/pdf/Countermeasures_HS811258.pdf)

“Promising Practices in Motorcycle Rider Education and Licensing,” National Highway

Traffic Safety Administration (NHTSA), DOT HS 809 852, July 2005

[www.nhtsa.dot.gov/people/injury/pedbimot/motorcycle/MotorcycleRider/](http://www.nhtsa.dot.gov/people/injury/pedbimot/motorcycle/MotorcycleRider/)

### Pedestrian Safety Resources

Administration on Aging, “Profile of Older Americans,” 2008

[www.aoa.gov/AoARoot/Aging\\_Statistics/Profile/index.aspx](http://www.aoa.gov/AoARoot/Aging_Statistics/Profile/index.aspx)

Anderson, R.W.G., McLean, A.J., Farmer, M.J.B., Lee,

B.H., and Brooks, G.B. Vehicle travel speeds and the incidence of fatal pedestrian crashes. *Accident Analysis and Prevention*, 29(5), pp. 667-674, 1997.

NCHRP Report 500, Volume 10: A Guide for Reducing Collisions Involving Pedestrians discusses many of these strategies in detail.

[onlinepubs.trb.org/onlinepubs/nchrp/nchrp\\_rpt\\_500v10.pdf](http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_500v10.pdf)

Evaluation of “Targeted Pedestrian Enforcement,” Salzberg, Phillip M and Moffat, John M, January 2003.

### Commercial Motor Vehicle Safety Resources

NCHRP Report 500, Volume 13, A Guide for Addressing Collisions Involving Heavy Trucks, addresses many of these strategies in detail.

[safety.transportation.org/guides.aspx?cid=34](http://safety.transportation.org/guides.aspx?cid=34)

### Emergency Medical Services Resources

“Model Trauma System Planning and Evaluation Tool”. Dept. of Health and Human Services, Health Resources and Services Administration; 2006

“Population-Based Research Assessing the Effectiveness of Trauma Systems”; Mullins, Richard J. MD; Mann, N. Clay PhD, MS; *Journal of Trauma-Injury Infection and Critical Care*; 47(3) Supplement:S59-S66; September 1999

U.S. Dept. of Health and Human Services; Health Resources and Services Administration; “A 2002 National Assessment of State Trauma System Development, Emergency Medical Services Resources, and Disaster Readiness for Mass Casualty Events.” August 2003 93rd US Congress: Public law 93-154: Emergency Medical Services System Act of 1973.

## Appendix D: Methodologies

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### Fatality and Serious Injury Rates

Fatality and serious injury rates are the number of fatalities or serious injuries in each category per 100 million vehicle miles traveled except for motorcyclist and pedestrian rates. The numerator, number of fatalities, is from FARS or the WSDOT Collision Database (see p. 85 for more information). The denominator, annual vehicle miles traveled, is from vehicle travel estimates developed by WSDOT.

Motorcyclist fatality and serious injury rates are the number of motorcyclist fatalities or serious injuries per 10,000 registered motorcycles. The numerator, number of motorcyclist fatalities, is from FARS and motorcyclist serious injuries from the WSDOT Collision Database. The denominator, registered motorcycles, is from vehicle and vessel statistics produced by DOL.

Pedestrian fatality and serious injury rates are the number of fatalities or serious injuries in each category per 100,000 persons in Washington. The numerator, number of fatalities, is from FARS or the WSDOT Collision Database. The denominator, statewide population estimate, is from population estimates developed by the Office of Financial Management (OFM).

Age- and race/ethnicity-specific fatality and serious injury rates are the number of fatalities or serious injuries in each category per 100,000 persons in Washington. The numerator, depending on whether the data is focused on number of fatalities or serious injuries, is from FARS or WSDOT. The denominator, statewide population estimate, is from population estimates developed by OFM.

### Fatality and Serious Injury Forecasts

Target Zero data analysts produced forecasts for measures in priorities one through three to aid strategic planning and short-term goal setting. Analysts used Holt's Method for fatalities and simple linear regression for serious injuries. Both of these forecasting techniques operate under the assumption that conditions in the past will continue to operate in the future. Therefore, current trends in fatalities and serious injuries give us an idea about predicted numbers and what we can expect to see in the future.

### Fatality Forecasts

Also known as linear exponential smoothing, Holt's Method is an extension of the single exponential smoothing forecasting method. It "smoothes" past fluctuations and extrapolates into the future for forecasts. The method gives more weight to most recent observations and less weight to older observations. In other words, the number of fatalities predicted next year depends more upon the number of fatalities last year than from 5 years ago (Chatfield 2001; Holt 2003; Hyndman 2008; McAllister 2002).

Fatality forecasts were generated using the ESM producer in SAS/STAT® software, Version 9.2 (SAS Institute Inc., Cary, NC). Fatal crash dates from 1999 to 2008 were modeled using the ESM procedure. The linear model option was specified and total fatalities were accumulated on yearly intervals. The resulting model then predicted the number of fatalities from 2009 to 2014 and calculated 95% confidence limits for each prediction. Forecasts were output by using the Output Delivery System (ODS) and graphed using Microsoft® Office Excel 2003.

### Serious Injury Forecasts

Due to a limited number of years of serious injury data, analysts were unable to use Holt's method to produce serious injury forecast numbers (Holt's Method requires at least 10 years of data points). Instead, analysts used linear regression to project serious injuries to 2011. Linear regression generally performs better than other projection methods when given a smaller number of data points to work with, but the more distant the projection, the less accurate the prediction. As the result of these limitations, this method was not considered to be reliable in long-range projections to 2030.

Ordinary Least Squares Method (OLS) was used to estimate coefficients and the measures of fit of the linear trend model. A predicted forecast range for serious injuries from 2009 to 2011 was then calculated using a standard error of estimate (the STEYX formula in Excel) at a 68% confidence for each prediction. Forecasts were created and graphed using Microsoft® Office Excel 2007.

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### Forecasting limitations

The Holt and linear regression methods used in this report extrapolated historical data to produce the forecast. Extrapolative methods of forecasting assume that safety initiatives will continue to be introduced at a similar rate and with similar effectiveness as in the past. Known and unknown external factors including more rapid introduction of safety measures, accelerated application of existing initiatives, changing enforcement tactics or substantial decreases in vehicle travel may result in fatality numbers below those forecasted.

### Trend Line to Reach Target Zero in 2030

The trend line to reach Target Zero in 2030 represents the overall trend change needed to achieve 0 fatalities in 2030. Analysts established this line by calculating the slope of the line segment between the predicted number of fatalities in 2008 and 0 fatalities in 2030. The slope of the line equals the overall fatality decrease needed each year to reach Target Zero in 2030.

$$\text{slope} = \frac{(0 - \text{number of predicted fatalities in 2008})}{2030 - 2008}$$

The number of fatalities to reach Target Zero in 2030 was then computed by the slope-intercept equation,  $y = mx + b$ , with a slope of  $m$  and a  $y$ -intercept of  $b$ . Thus, the following equation yields the number of fatalities in a given year,  $i$ , needed to reach 0 fatalities in 2030:

$$\text{TZ fatalities in year}_i = (\text{slope} \times (\text{year}_i - 2008)) + \text{number of predicted fatalities in 2008}$$

### Fatality Goals

When fatality trends were flat, or decreasing at a rate less than the “zero-in-2030” line, Washington set goals for halfway between the predicted value for each year and the “zero-in-2030” value. In instances where fatality trends are meeting or exceeding the “zero-in-2030” trend (such as Drivers age 16-20 and unrestrained vehicle occupants), goals were set to match the current trend line. Finally, in the one instance where

the trend is going in the wrong direction (motorcyclists) goals were set to match the “zero-in-2030” values.

### References

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# Appendix E: Data Sources for Target Zero

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## The Fatality Analysis Reporting System (FARS)

The Fatality Analysis Reporting System (FARS) is a nationwide database that characterizes the crash, the vehicles, and the people involved in each fatal crash reported. FARS contains more than 100 coded data elements that are collected from official documents, including Police Traffic Crash Reports, State Driver Licensing & Vehicle Registration Files, Death Certificates, Toxicology Reports, and Emergency Medical Services Reports. To be included in FARS, a crash must involve a motor vehicle traveling on a traffic way customarily open to the public and result in the death of a person (either an occupant of a vehicle or a non-motorist) within 30 days of the crash. The Washington Traffic Safety Commission contracts with NHTSA to provide FARS for Washington State.

## Collision Location & Analysis System (CLAS)

The collision data repository, otherwise known as the Collision Location & Analysis System (CLAS), is housed at the Washington State Department of Transportation. The source for CLAS collision data is either from law enforcement officers via the Police Traffic Collision Report or citizens via the Vehicle Collision Report, with an approximate split of 90%/10% submitted reports, respectively. CLAS stores all reportable traffic collision data for Washington State public roadways. A collision needs to meet at least one of the two following criteria to be considered as a “reportable” collision thereby making the collision record available to customers: 1) a minimum property damage threshold of \$700, and/or 2) bodily injury occurred as a result of the collision.

Within *Target Zero*, CLAS collision data was used for counts of seriously injured people. However, there are three sections within *Target Zero* that also used CLAS collision data for counts of fatally injured people as well. Those sections are as follows: 1) Opposite Direction Multi Vehicle Collisions, 2) Run-off-the-Road Collisions, and 3) Intersection Collisions. CLAS collision data will also be used during the Target Zero strategy evaluation phase.

## DOL Drivers Data Mart

Data used in this document from the Department of Licensing (DOL) was gathered from a database known as the DOL Drivers Data Mart. This data is updated daily from several sources that comprise the DOL driver records and stored in a SQL Server 2005 format. The Drivers Data Mart database is a replication of the DOL Driver database, which is the primary data store for the automated systems supporting the DOL Driver Division. Drivers Data Mart is in a relational format with friendly data names and additional indexes. The primary purpose of this database is to support ad-hoc queries. The database contains the complete driver records for all Washington drivers, which number slightly over 5 million as of January 2010.

## Population Data

Population estimates, including age-, gender-, and race/ethnicity-specific are from the Office of Financial Management (OFM). Population estimates used in this report are available electronically at <http://www.ofm.wa.gov/pop/default.asp>.

## Vehicle Miles Traveled (VMT) Database

VMT is a measure of the total number of miles traveled by all vehicles over a segment of road or a network of roads with known length over a specific period of time, either a day or a year. The WSDOT Transportation Data Office (TDO) collects and reports several different types of road and street data to the Federal Highway Performance Monitoring System (HPMS) each year. The TDO collects traffic data for state highways and relies on local jurisdictions to provide traffic data for their roads and streets.

VMT is calculated by multiplying (length of road segment) x (the Average Annual Daily Traffic [AADT] that traveled on that road segment). For example, a 15 mile road with 10,000 AADT would equate to 150,000 daily VMT or 54,750,000 annual VMT. The total VMT for a highway network or region is a summation of VMT for all segments of roads that make up the network or region. Statewide VMT is a summation of all segments of road statewide.

# Appendix F: FARS and CLAS Codes

## Data Included in the Target Zero Measures: Definitions and Codes

Measure	FARS Definition	FARS Codes	CLAS Definition	CLAS Codes
<b>Priority Level One</b>				
Drug and/or Alcohol Impaired Driver Involved	Fatality resulting from crash involving one or more drivers with a BAC of .08 or more or positive drug test result	if ((7<alc_res<95) or (99<drugres1<996) or (99<drugres2<996) or (99<drugres3<996)) then idi=1; *limited to drivers;	Serious injury resulting from crash with a driver contributing circumstance 1--3 of alcohol, drugs, or medication.	If Motor Vehicle Driver and Contributing Circumstance 1,2 or 3 is "Under Influence of Alcohol", "Under Influence of Drugs", "Had taken Medication"
Drug Impaired Driver Involved	Fatality resulting from crash involving one or more drivers with a positive drug test result	if (((99<drugres1<996) or (99<drugres2<996) or (99<drugres3<996)) then drug-imp=1; *limited to drivers;	Serious injury resulting from crash with a driver contributing circumstance 1--3 of drugs or medication.	If Motor Vehicle Driver and Contributing Circumstance 1,2 or 3 is "Under Influence of Drugs", "Had taken Medication"
Alcohol Impaired Driver Involved	Fatality resulting from a crash involving one or more drivers with a BAC of .08 or more.	if (7<alc_res<95) then alc_imp=1;	Serious injury resulting from crash involving one or more drivers with contributing circumstance 1--3 of alcohol.	If Motor Vehicle Driver and Contributing Circumstance 1,2 or 3 is "Under Influence of Alcohol"
Drinking Driver Involved	Fatality resulting from crash involving one or more drivers with positive BAC or police reported alcohol involvement	if (alcohol=1 or (0<alc_res<95)) then ddi=1; *limited to drivers;	Serious injury resulting from crash involving one or more drivers with positive BAC or police reported alcohol involvement	If Motor Vehicle Driver and ((Contributing Circumstance 1,2 or 3 is "Under Influence of Alcohol", "Under Influence of Drugs", "Had taken Medication") or (Sobriety Level is "Had Been Drinking-Ability Impaired", "Had Been Drinking-Ability Unknown, "Had Been Drinking-Ability Not Impaired"))
Run-Off-The-Road	FARS Data Not Used	FARS Data Not Used	First collision occurring outside the travelled way.	if (first_collision_type_code in(32 50 51 52) and object_struck ^in(22 25 26 27 28 40 49 52 53 54 55 60 62 67 79 80 81 82) ; check 49, 52, 53, 67
Speeding	Crash involving a driver going too fast for conditions or exceeding the posted speed limit.	1993-2007: if (dr_cf1=44 or dr_cf2=44 or dr_cf3=44 or dr_cf4=44) then speed=1;  2008: if (43<=dr_cf1<=44 or 43<=dr_cf2<=44 or 43<=dr_cf3<=44 or 43<=dr_cf4<=44) then speed=1;  2009: if speed_related=1 then speed =1	Crash involving a driver going too fast for conditions or exceeding the posted speed limit.	If Motor Vehicle Driver and Contributing Circumstance 1,2 or 3 is "Exceeding Stated Speed Limit", "Exceeding Reasonable and Safe Speed"

Source: WTSC's FARS database, WSDOT's CLAS database

# Appendix F: FARS and CLAS Codes

## Data Included in the Target Zero Measures: Definitions and Codes

Measure	FARS Definition	FARS Codes	CLAS Definition	CLAS Codes
<b>Priority Level Two</b>				
Young Drivers	Drivers between 16 and 25 years old involved in fatal crash	if (per_typ=1 and 16<=age<=25) then yngdrv=1;	Drivers between 16 and 25 years old involved in serious injury crash	if (involve_person_type='MV Driver' and 16<=age<=25)
Drivers 21-25	Drivers between 21 and 25 years old involved in fatal crash	if (per_typ=1 and 21<=age<=25) then yngdrv=1;	Drivers between 21 and 25 years old involved in serious injury crash	if (involve_person_type='MV Driver' and 21<=age<=25)
Drivers 16-20	Drivers age 20 or younger involved in fatal crashes.	if (per_typ=1 and 16<=age<=20 then dr20=1;	Drivers age 20 or younger involved in serious injury crashes.	if (involve_person_type='MV Driver' and age<=20)
Distracted	Driver with an officer-reported contributing circumstance of Inattentive/ Careless (Talking, Eating, Car Phones, etc.)	if (dr_cf1 in(3 6 94) or dr_cf2 in(3 6 94) or dr_cf3 in(3 6 94) or dr_cf4 in(3 6 94)) then inattn=1; *limited to drivers;	Driver with an officer reported contributing circumstance in the crash of inattentive or one or more driver distraction codes.	if (cc1=23 or cc2=23 or cc3=23 or 40<=cc1<=50 or 40<=cc2<=50 or 40<=cc3<=50) then inattn=1;
Unrestrained Passenger Vehicle Occupant	Occupant of a passenger vehicle either not using or improperly using a seat belt, child safety seat, booster seat	if (0<body_typ<=49 and per_type in(1 2 9) and rest_use in(0 13 14));	Occupant of a passenger vehicle not using a seat belt, child safety seat, booster seat	if (vehicle_type in(1 2) and restraint_type=1);
Intersection Related	FARS data not used	FARS data not used	Intersection related	if junction_relationship_code in('1' '2' '6' 'A' 'B' 'C' 'E' 'F') then intersect=1;
<b>Priority Level Three</b>				
Opposite direction multi-vehicle collisions	FARS data not used	FARS data not used	Fatal and Serious injuries resulting from opposite direction vehicle crashes, excluding intersection related crashes	if (first_collision_type_code in(24 25 26 27 30) and junction_relationship_code ^in('1' '3' '6' 'A' 'B' 'C' 'D'));
Motorcyclist	Number of motorcyclist fatalities; (excludes scooters/ mopeds)	if body_typ in(80 82 83)	Number of motorcyclist serious injuries	if vehicle_type=12
Pedestrian*	Number of pedestrian fatalities	if per_typ in(5 8) ;	Number of pedestrian serious injuries	if involved_person_type='Pedestrian';
Unendorsed Motorcycle Operator	Motorcycle operator without license for class of vehicle or an invalid non-commercial license status	if (body_typ in(80 82 83) and per_type=1) then do; if (l_comp=1 or (l_comp=3 and l_status in(5 6 7 8))) then lic=1; *proper; else if (l_comp=9 or l_status=9) then lic=3; *unknown; else lic=2; *improper; end;	CLAS Database Not Used	CLAS Database Not Used
Unhelmeted Motorcyclist	Motorcycle operator or passenger fatality not using a helmet.	if (body_typ in(80 82 83) and per_type=1 and rest_use=0);	Motorcycle operator or passenger serious injury not using a helmet.	if helmet_usage=2;
Heavy Truck	Crash involving a vehicle greater than 10,000 lbs.except buses & motorhomes.	if (body_typ in(60 61 62 63 64 66 67 68 69 70 71 72 74 75 76 77 78)) then hti=1;	Crash involving a vehicle greater than 10,000 lbs.	if (vehicle_type_code in(4 5 6 7) or vehicle_usage in(21 28 29 30 31 32 33 34));

Source: WTSC's FARS database, WSDOT's CLAS database

# Appendix F: FARS and CLAS Codes

## Data Included in the Target Zero Measures: Definitions and Codes

Measure	FARS Definition	FARS Codes	CLAS Definition	CLAS Codes
<b>Priority Level Four</b>				
Older Drivers 75+	Fatalities resulting from crash involving driver age 75 or older	if per_typ=1 and 70<=age<=97	Serious injuries resulting from crash involving driver age 75 or older	if (involved_person_type="MV Driver" and age>=75;
Drowsy	Driver with an officer reported contributing circumstance in the crash of apparently asleep or apparently fatigued	if (dr_cf1=1 or dr_cf2=1 or dr_cf3=1 or dr_cf4=1) then drowsy=1; *limited to drivers;	Driver with an officer reported contributing circumstance in the crash of apparently asleep or apparently fatigued	if (cc1 in(14 32) or cc2 in(14 32) or cc3 in(14 32)) then drowsy=1;
Bicyclist	Unicyclist, bicyclist, or tricyclist fatality involving motor vehicle.	if per_typ in(6 7);	Seriously injured unicyclist, bicyclist, or tricyclist involving a motor vehicle.	if involved_person_type in('Pedcyc Driver' 'Pedcyc Passenger') ';
Work Zone	Fatalities occurring in construction or maintenance zone	if 1<c_m_zone<=4	Serious injuries occurring in construction or maintenance zone	if (1<=workzone_status_code <=5)
Wildlife	Fatalities caused by collisions with wildlife	if seq1=11;	Serious injuries occurring in construction or maintenance zone	if (1<=workzone_status_code <=5)
Vehicle-Train Involved	Fatalities caused by collisions with trains	if seq1=10;	Serious injuries cause by collision with train	if 40<=first_collision_type_code<=43
School Bus Related	Fatalities resulting from a crash involving a vehicle functioning as a school bus	if sch_bus=1;	Serious injuries resulting from a crash involving a school bus	if vehicle_type=11
Aggressive Drivers	Road Rage/Aggressive Driving (since 2004)	if (dr_cf1=8 or dr_cf2=8 or dr_cf3=8 or dr_cf4=8) then aggress=1; *limited to drivers	CLAS Database Not Used	CLAS Database Not Used
<b>Other Measures</b>				
Rural	Fatalities on rural roads	if 1<=road_fnc_class<=9;	Serious injuries on rural roads	
Urban	Fatalities on urban roads	if 11<=road_fnc_class<=19;	Serious injuries on urban roads	
Fatal Traffic Crash	Any motor vehicle crash entered into FARS.		Crash where most severe injury is 'Dead on Arrival', 'Dead at Scene', or 'Died at Hospital'	if 2<=most_severe_injury_type_code<=4
Serious Injury Crash	FARS data not used	FARS data not used	Crash where most severe injury is 'Serious Injury'	if most_severe_injury_type_code=5
Traffic Fatalities	A person who dies within 30 days of a motor vehicle crash as a result of injuries sustained in the crash.	if inj_sev=4;		if injury_type in('Dead at Scene' 'Dead on Arrival' 'Died at Hospital')
Serious Injuries	FARS data not used	FARS data not used		if injury_type='Serious Injury';

Source: WTSC's FARS database, WSDOT's CLAS database