OREGON TRANSPORTATION SAFETY ACTION PLAN UPDATE

Technical Memorandum #1

Emphasis Area Selection and Data Sources

prepared for

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October 1, 2015

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Executive Summary

Emphasis areas (EAs) provide a strategic framework for the development and implementation of the Strategic Highway Safety Plan (SHSP). The selection of emphasis areas is therefore an important step in the planning process that should be based on the best available data and consideration of a range of policy and implementation factors.

This memo details the types of criteria and considerations that can inform the EA selection process. EA selection is not a strictly quantitative process, but rather uses crash and other safety data as inputs into the process, with the ultimate goal of choosing EAs through consensus among safety stakeholders.

The range of factors to be considered in the SHSP development process are suggested through MAP-21 and FHWA guidance, but explicit criteria for emphasis area selection are not provided. Based on available guidance and experience from other states, common quantitative criteria have been identified, including: number of fatalities and serious injuries, crash severity, and fatality and serious injury trends.

Along with these criteria, implementation factors should be accounted for in selecting EAs, such as: institutional capacity, availability of countermeasure effectiveness data or data to evaluate new projects or programs, and opportunities to combine EA implementation for greater efficiency. Consistency with established plans and policies is also a consideration when selecting EAs.

Although emphasis areas typically relate directly to crash types or behaviors, some states have also established foundational emphasis areas that focus on broader efforts such as integration of various safety datasets or improved emergency medical response. It may be difficult to directly associate progress within these categories to reductions in fatalities and serious injuries, but improvements in these areas are essential for understanding and addressing transportation safety problems over the long term.

In addition to crash, traffic, and roadway data, there are other quantitative data sources that can be considered in the EA selection process if the data is available, timely, statewide, and reliable. These include: pre-hospitalization and trauma data, various surveys, law enforcement data, and other emerging datasets. In general, these data sources are more likely to assist in strategy development and implementation, but may also shed light on the EA selection process.

As mentioned, the selection of EAs for the SHSP or Transportation Safety Action Plan (TSAP) should account for a wide range of quantitative and qualitative factors. These are summarized in a draft framework presented at the conclusion of this memo. Subject to discussion with the PMT,

the PAC could use this framework to gain input and organize the discussion surrounding EA selection.

1.0 Introduction and Purpose

This technical memorandum is intended to inform the criteria for selecting emphasis areas (EAs) for the Oregon Transportation Safety Action Plan (TSAP), which also fulfills the federal requirements for Oregon's Strategic Highway Safety Plan (SHSP). Additionally, the memo identifies relevant Oregon-specific data sources which could be used to support the TSAP development process.

The memo begins with a discussion of Federal Highway Administration (FHWA) and MAP-21 guidance for developing an SHSP, including the types of data which can satisfy FHWA's "data driven" approach to Strategic Highway Safety Plans. "Typical" approaches to emphasis area selection are discussed, such as the types of resources, analyses, decision criteria, and processes for selecting emphasis areas used by other states. Examples of different approaches are documented where relevant.

The memo also identifies potential data sources to be used in emphasis area selection for Oregon. While crash data typically serves as the primary data source for emphasis area selection, other sources such as health data may also play a role. These data sources are summarized and their potential role in emphasis area selection is explored.

The memo concludes with a draft framework for selecting emphasis areas. The framework includes quantitative and qualitative criteria and allows for stakeholder input. We look forward to discussing and potentially revising this framework based on input from the PAC.

2.0 Emphasis Area Selection

Emphasis areas are selected as priority transportation safety focus areas for the SHSP (TSAP).. A wide variety of issues can be included in emphasis areas. In keeping with the strategic nature of the SHSP, states often select a smaller number of emphasis areas based on the most prevalent crashes and concerns in their respective states. EA selection is always based on consideration of available quantitative data but may also take into account qualitative factors, such as guidance from other state policies or plans, or feasibility of implementation. While federal regulations outline the broad process and requirements for developing an SHSP, there is not a clearly-defined process or set of criteria that all states must follow to select emphasis areas. The following sections describe the regulations, guidance, and possible criteria that inform the EA selection process.

2.1 MAP-21 and FHWA Guidance

As part of the overall movement toward performance-based planning, MAP-21 requires that the selection of EAs and strategies be 'data-driven'. FHWA guidance indicates that in developing their SHSPs, states must 'use the best available safety data to identify critical highway safety problems and safety improvement opportunities on all public roads, including non-State-owned public roads and roads on tribal land.'[1] Crash (fatalities and serious injuries), roadway, and traffic volume data are listed as the primary sources of information, but the analysis does not need to be limited to these sources.

FHWA also requires that states 'consider additional safety factors when identifying emphasis areas and strategies for their SHSP updates.' These additional factors to be considered include:[2]

- Findings of Road Safety Audits (RSA). RSA findings can be analyzed to identify common countermeasure recommendations, which may be particularly appropriate for systemic implementation.
- Locations of fatalities and serious injuries.
- Locations that possess risk factors for potential crashes.
- Rural roads, commensurate with the number of fatalities on urban and rural facilities.
- Motor vehicle crashes that include fatalities or serious injuries to bicyclists and pedestrians.
- Cost-effectiveness of improvements.
- Improvements to rail-highway grade crossings.
- Safety on all public roads, including non-State-owned public roads and roads on tribal land.
- Older Drivers and Pedestrians Special Rule: If there has been an increase in fatalities and serious injuries to older drivers and older pedestrians, States must include strategies to address those increases in the SHSP updates. (23 U.S.C. 148(g)(2)).

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[1] FHWA. Strategic Highway Safety Plan (SHSP) Guidance. April 2013. http://www.fhwa.dot.gov/map21/guidance/guideshsp.cfm

[2] 23 USC. Ch.1, Sec. 148. https://www.law.cornell.edu/uscode/text/23/148

In addition to the requirement that SHSPs are data-driven and include the factors listed above, consultation with a broad set of stakeholders is required, and the SHSP must be consistent with other state plans and processes.

Although FHWA outlines these stipulations pertaining to SHSP development and broadly requires that the SHSP be data-driven, it does not identify a specific process for selecting EAs and strategies.

2.2 Emphasis Area Selection Criteria and Considerations

The purpose of choosing EAs is to focus resources on safety problems that offer the greatest potential for reduction of fatal and serious injuries. Several quantitative criteria for identifying these problems are discussed in detail below, along with implementation factors, consideration of other Oregon plans and policies, and establishment of foundational EAs.

2.2.1 Quantitative Evaluation Criteria

Number of Fatalities and Serious Injuries

Ranking potential EAs by fatal and serious injury counts is an intuitive method for selecting EAs for the plan. Potential EAs with a high number of fatalities and serious injuries are likely to offer a strong potential for reduction; however, there is not necessarily a one-to-one relationship between the number of fatalities and serious injuries and the potential for reduction. Some crash types are easier to address through proven countermeasures, while others lack proven safety countermeasures or may be very expensive to mitigate. Another consideration is that some emphasis areas are broader than others and direct comparison of fatality and injury counts between them can be misleading. For example, as a potential emphasis area, 'intersections' refers to all crashes that occur at a broad category of locations, which are a natural source of conflict. By contrast, potential emphasis areas related to a specific mode (e.g., bicycle, pedestrian, motorcycle) represent a narrower range of the overall traveling public.

Despite these concerns, it is common practice to rank potential EAs by the total number of fatalities and serious injuries. For example, in its latest SHSP update, Montana ranked potential emphasis areas by fatal and serious injuries and chose the top five categories (distracted driving, intersections, roadway departure, impaired driving, and occupant protection) as emphasis areas for the Plan. Similarly, Washington designated priority one categories that account for over 30 percent of fatal and serious injuries in its 2013 SHSP update. Priority levels two and three are also based on the number of fatal and serious injuries.

In its last SHSP update, Virginia selected emphasis areas after reviewing a chart that showed the percent of fatal and serious injuries associated with each traffic safety problem area from its previous SHSP. The state felt that while the contributing factors were often interrelated, the

critical areas to target were evident based on this information. For example, roadway departure crashes, which represented the highest number of fatal and serious injuries, often include inappropriate speed, unrestrained occupants, and a distracted driver.

Fatal and serious injury counts are especially useful in conjunction with other information such as severity and trends.

Crash Severity

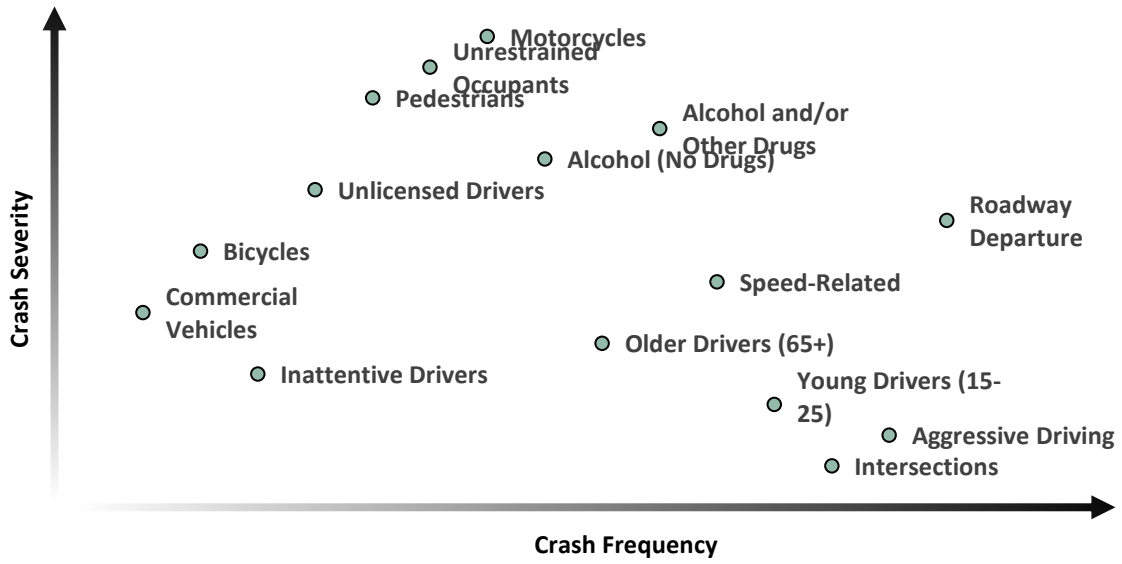
The severity of a given crash type may tell a different story than fatality and serious injury counts alone. Some crashes, such as those involving motorcyclists, pedestrians, or bicyclists account for a small portion of total crashes, but a much larger percentage of fatalities or serious injuries. Several states (e.g., Ohio, Alaska, and Idaho) have included pedestrians, bicyclists, and motorcyclists as EAs due at least in part to the severe nature of these crashes. In Ohio and Alaska, these three categories were combined into a single emphasis area, while in Idaho pedestrians and bicyclists were grouped together and motorcycles were addressed separately.

Crash severity metrics can also illustrate EAs that tend to be less severe than others. For example, intersection crashes contribute to a substantial portion of the overall number of crashes in Oregon (47 percent), but a relatively small portion of fatalities (20 percent). As a result, achieving a significant reduction in fatalities and serious injuries through application of intersection countermeasures and strategies will typically require a high number of total crashes to be eliminated.

Figure 1 below shows potential emphasis areas ranked from low to high fatal and serious injury crashes and low to high severity of crashes.[3] To develop the chart, potential emphasis areas were ranked separately on the basis of total number of fatal and serious injury crashes (x-axis) and the number of fatal and serious injury crashes per 100 total crashes (y-axis). Crash categories in the upper right of the diagram could be considered as choices for EA from the perspective there is a high frequency and high severity rate; however, this information should be considered in the broader context of the other factors discussed in this memo.

[3] See Appendix for crash frequency and severity rankings by potential emphasis area.

Figure 1. Potential Emphasis Areas by Crash Frequency and Severity Rankings (2009-2013)



Source: Crash Analysis for TSAP update, based on data provided by ODOT.

Fatality and Serious Injury Trends

In addition to fatal and serious injury counts and crash severity, EA selection could take into account whether fatalities and serious injuries are increasing or decreasing. Trends may be expressed based on the total number of fatal or serious injuries or on the trend of each potential emphasis area with respect to the other categories. Metrics for evaluating emphasis area trends include:

- Percentage change in the number of fatal or serious injuries over a given time period.
- Change in the percentage of statewide fatal or serious injuries attributable to the emphasis area.

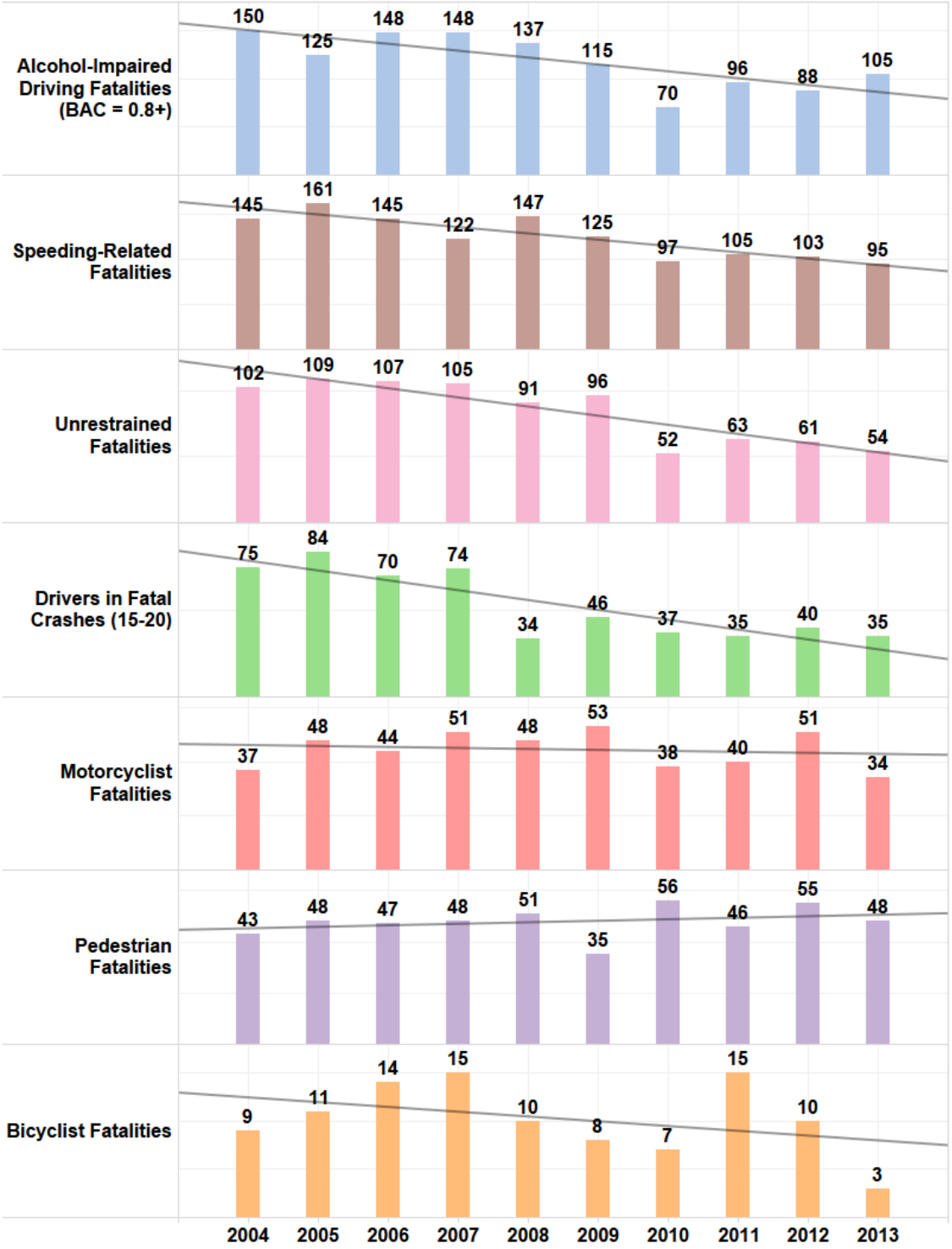
A ten year fatality-only trend analysis (2004-2013) is shown in Figure 2, based on data from the National Highway Traffic Safety Administration's (NHTSA) Fatality Analysis Reporting System (FARS) for the NHTSA Performance Measures (PM). These PMs are not directly comparable to the potential EAs used elsewhere in this memo and throughout the TSAP analysis process due to data definitions, but generally correspond closely.

Figure 2 illustrates a downward trend for all NHTSA PMs except pedestrian fatalities. Motorcyclist fatalities have only decreased slightly, but the decrease in other PMs has been more substantial. It is worth noting, however, that the trend in the last five years appears to have flattened for several categories (e.g., Alcohol-Impaired Driving Fatalities, Young Drivers in Fatal Crashes). The

average annual change for each over the ten year timeframe is shown in Table 1, along with the change over the most recent five year timeframe (2009-2013). The trend line and average annual change calculations were established by linear regression.

Trend lines depict the overall direction in fatalities and can highlight categories with increasing fatalities. However, they should be interpreted cautiously as trend calculations are influenced by the selection of start and end points for the analysis. This is particularly relevant for bicycle fatalities due to the small number of fatalities. For instance, the trend line for 2004-2012 would be somewhat different than for 2004-2013 due to the unusually low number of bicyclist fatalities in 2013.

Figure 2. FARS Performance Measures, 2004-2013



Source: National Highway Traffic Safety Administration. Fatality Analysis Reporting System.

Table 1. Average Annual Change for NHTSA Performance Measures, 2004-2013

NHTSA Performance Measures	Average Annual Change, 2004-2013 (10-Year Trendline Slope)	Average Annual Change, 2009-2013 (5-Year Trendline Slope)
Alcohol-Impaired Driving Fatalities	-7 per Year	-0.2 per Year
Speeding-Related Fatalities	-7 per Year	-5 per Year
Unrestrained Fatalities	-7 per Year	-8 per Year
Drivers in Fatal Crashes (15-20)	-6 per Year	-2 per Year
Motorcyclist Fatalities	-0.4 per Year	- 3 per Year
Pedestrian Fatalities	+0.6 per Year	+2.5 per Year
Bicyclist Fatalities	-0.5 per Year	-0.7 per Year

Source: National Highway Traffic Safety Administration. Fatality Analysis Reporting System

Table 2 shows the year-to-year percentage change in fatality and serious injury crashes within each potential EA since 2009. For example, there were 501 fatal and serious injury crashes involving aggressive driving in 2009, followed by a 9.4 percent increase in 2010 , an additional 10 percent increase in 2011, and a decline in 2012 (-6 percent) and 2013 (-3.4 percent). A trend line for fatal and serious injury crashes was also calculated for each potential EA over the 2009-2013 timeframe, and the resulting slope from this calculation is shown in the last column of Table 2.

An important limitation of this analysis is that serious injury data from 2011 and later are not directly comparable to earlier years due to an increase in non-fatal crash data collection in the ODOT system. The increase in reported serious injuries between 2010 and 2011 was approximately 11.5 percent, but it is not known what portion of these may represent an actual increase in injuries as opposed to what is attributable to the change in reporting process. Another consideration when studying this data is that crashes fluctuate on an annual basis, so major conclusions about the directionality of the data should be interpreted cautiously.

Rhode Island examined trend data for 15 key emphasis areas (run-off-the road, intersections, impaired driving, unrestrained occupants, young drivers, older drivers, motorcycles, pedestrians, bicycles, distracted driving, fatigued driving, speeding and aggressive driving, head on collisions, median cross over collisions, and work zones) over the previous ten years (2001 to 2010) and then determined which trends indicated serious ongoing problems and the need for emphasis areas in the SHSP. While the total number of pedestrian and bicycle fatalities and serious injuries was not large, there was a disturbing increase in the number of pedestrian fatalities in the state's largest city, which resulted in the addition of pedestrian and bicyclists as an emphasis area. Older drivers were also added given expected increases in the older driver population over the next ten years, and distracted driving was added due to interest and concern from the public.

Table 2. Annual Change in Fatal and Serious Injury Crashes since 2011 by Potential Emphasis Areas

Potential Emphasis Area	2009 Fatal and Serious Injury Crashes	Annual Change				Average Annual Change, 2009-2013 (5-Year Trend line Slope)
		2010	2011	2012	2013	
Roadway Departure Crashes	747	6.2%	11.2%	-0.3%	-8.8%	+19.6 per Year
Aggressive Driving Involved	501	9.4%	10.0%	-6.0%	-3.4%	+11.3 per Year
Intersections Crashes	419	19.1%	15.2%	1.0%	-3.8%	+36.2 per Year
Young Drivers - 15-25 Involved	401	20.7%	6.0%	0.4%	-12.0%	+13.5 per Year
Speed-Related Crashes	379	11.1%	7.6%	-8.4%	-3.9%	+3.4 per Year
Alcohol and/or Other Drugs Involved	288	-2.8%	29.3%	11.3%	-10.2%	+27.1 per Year
Older Drivers - 65+ Involved	271	5.9%	13.9%	7.6%	-11.6%	+14.5 per Year
Alcohol Involved (No Drugs)	246	-2.8%	32.2%	8.9%	-12.8%	+21.3 per Year
Unrestrained Occupants	203	-16.3%	35.9%	-2.6%	-11.1%	+4.9 per Year
Motorcycle Involvement	198	3.5%	20.5%	14.6%	-16.3%	+15.6 per Year
Pedestrian(s) Injured or Killed	128	21.1%	5.8%	6.1%	-14.4%	+6.1 per Year
Unlicensed Drivers Involved	89	-4.5%	60.0%	14.7%	-12.2%	+16.7 per Year
Pedalcycle(s) Injured or Killed	66	-33.3%	81.8%	-1.3%	-17.7%	+3.3 per Year
Inattentive Drivers Involved	55	29.1%	11.3%	1.3%	-18.8%	+2.9 per Year
Commercial Motor Vehicle Involved	49	49.0%	12.3%	-35.4%	22.6%	+1.2 per Year

Source: Crash Analysis for TSAP update, based on data provided by ODOT. Note: A higher number of crashes may be reported as of 2011 compared to prior years. This result from a change to an internal departmental process and does not necessarily reflect an increase in annual crashes.

2.2.2 Implementation Considerations

In addition to evaluating potential EAs on the basis of quantitative criteria, there are several additional factors related to plan implementation that should be considered. These are described in detail below.

Availability of Proven Countermeasures and Evaluation Data

In order to address an identified safety problem, practitioners need countermeasures that have been proven to be effective in dealing with the problem, or must be able to evaluate the results of implementing unproven countermeasures. Countermeasure effectiveness is an active area of research in the transportation safety community, and significant progress has been made over the past several decades; however, there are many gaps in the literature, particularly for behavioral countermeasures. In addition to the lack of research for certain countermeasures, the applicability of countermeasures in other geographic areas or contexts outside the study area is not always clear. To address both the lack of countermeasure data and questions surrounding the

validity of countermeasures, it is important to incorporate evaluation into the safety planning and implementation process. If reliable countermeasure data for an emphasis area is lacking and evaluation cannot be implemented due to data quality or other resource constraints, careful consideration should be given to selecting the EA.

The State of Washington developed a rating system to evaluate the effectiveness of strategies included in its SHSP. Each strategy was rated as proven, recommended, or unknown, based on literature from NHTSA's Countermeasures that Work, FHWA's Crash Modification Clearinghouse, and NCHRP Report 500 Series. This research may serve as a useful reference for consideration of EAs in Oregon. For instance, potential EAs could be cross-checked against the Washington SHSP (and other countermeasure resources) to quickly assess whether effectiveness data is available.

Institutional Capacity

Another important consideration in selecting EAs is whether there is an identified lead agency or individual to implement EA strategies. Without this person or agency to coordinate strategy implementation, little progress is likely to be made. In some cases, EAs align closely with existing agency or staff responsibilities, but this is not always the case, particularly for those that address emerging issues such as distracted driving.

Where existing resources are allocated to projects or programs that closely align with a potential EA, an argument can be made for selecting the topic as an emphasis area for the plan. For example, in updating its SHSP, Colorado DOT relied on the previously existing Colorado Teen Driving Alliance to develop and implement young driver strategies that align with their current activities. This decision was made in recognition that the DOT could not effectively manage all of the EAs that were proposed for inclusion in the Plan. 'Outsourcing' the Young Driver emphasis area allowed the topic to be addressed in the Plan without creating unrealistic expectations of CDOT staff. Similar opportunities may exist in Oregon where EA goals and strategies align with existing programs or fall outside of statutory authority.

Overlap and Aggregation of Emphasis Areas

Certain potential EAs overlap to such an extent that separate efforts may not be the most efficient use of resources. For instance, 43 percent of Oregon's roadway departure fatal and serious injury crashes are speed-related, and these account for 85 percent of Oregon's total speed-related fatal and serious injury crashes. As such, a comprehensive approach to addressing roadway departure crashes would target a high percentage of speed-related fatal and serious injuries, and therefore a separate speeding emphasis area may not be needed. Taking this approach would require a careful review of the data to ensure that speeding is adequately addressed in all contexts. For instance, the other 15 percent of speed-related fatal and serious injury crashes that are not roadway departure crashes may illustrate problems in urban areas that need to be addressed through other emphasis areas. To address safety concerns that overlap

multiple EAs, California has made a decision to require that all cross cutting strategies and actions be identified and the relevant EA teams must meet to determine which team will take the lead on implementation and which team(s) will participate in a support capacity.

In addition, some EA categories could be combined to develop higher-level groupings, such as 'infrastructure' (intersections and roadway departure crashes), 'risky behaviors' (impaired driving, occupant protection), or 'vulnerable users' (pedestrians, bicyclists, motorcyclists). These groupings make the most sense when the strategies and stakeholders are similar and are likely to benefit from coordination. For example, in Ohio, young drivers, impaired driving, seat belt use, distracted driver, older drivers, and speeding were addressed together under a 'High-Risk Drivers' emphasis area. Similarly, Montana and Louisiana combined roadway departure and intersections because the same set of stakeholders was likely to be involved in both groups and similar processes were involved in addressing both types of crashes. As part of the emphasis area selection process in Montana, there was considerable discussion on whether pedestrians and bicyclists should be selected as an emphasis area. While they were not ultimately selected in Montana, it was demonstrated that a high percentage of pedestrian and bicycle crashes could be addressed through the selected emphasis areas (intersections in particular).

2.2.3 Foundational Elements

Certain potential emphasis areas are difficult to quantify yet they still serve a supporting role for reductions in fatalities and serious injuries related to other potential emphasis areas. Examples include: improving safety datasets and linkages or increasing capacity for EMS responders. Several states include foundational emphasis areas in their SHSPs including Colorado and Virginia (Data), Iowa (Research and Data), Michigan (System Administration), and Wisconsin and California (EMS). Efforts within these categories are needed to make long-term progress, but are difficult to compare directly against other emphasis areas on a quantitative basis.

Data-related improvements support progress in other emphasis areas by providing agencies with the best available information on existing locations in need of safety improvements, emerging safety concerns, and the effectiveness of programs and projects. Data improvements also support a proactive approach to addressing safety concerns through risk factor identification.

2.2.4 Consistency with Other Plans and Policies

The SHSP must be integrated and consistent with other plans and policies in Oregon. To the extent possible, the SHSP should reflect priorities established in these plans and policies and vice versa. Safety is addressed in several state plans and policies, including Oregon's Transportation Plan, modal plans (Rail Plan, Bicycle and Pedestrian Plan), and topic plans (Transportation Options Plan, Freight Plan). ODOT staff has conducted an extensive review of Oregon's plans and policies and developed a matrix that documents the relationship of plan strategies and policies with TSAP

issue areas (see Appendix C). From our perspective, the following key themes related to TSAP development and EA selection emerged from this review: Community Livability, Safe Multimodal Interactions, Data and Analysis, Enhanced Emergency Response, and Safety Culture. Each of these topics is discussed briefly below.

Community Livability

The development of sustainable and livable communities is recognized as an important policy priority for Oregon. Provision of safe and convenient bicycling and walking facilities is an essential strategy for making communities more livable. Related to this, bicycling and walking for transportation contributes to several state goals, such as improved health, economic vitality, and reduced environmental impacts. Compared to other modes of travel, the use of bicycling and walking is directly tied to community health and livability,[4][5] which makes bicycle and pedestrian safety a key aspect of achieving Oregon's policy goals.

Safe Multimodal Interactions

The safe and efficient movement of freight is necessary to maintain a healthy Oregon economy. However, there are tradeoffs between the movement of freight and provision of bicycling and walking facilities, or implementation of other transportation safety features, particularly in urban areas. Design and operating conditions that are conducive to efficient movement of goods (e.g., higher speed limits and operating speeds, larger turning radii, wider lanes) may be harmful for other modes, particularly pedestrians and bicyclists. These issues are most prominent on higher-volume arterials and collectors in urban areas.

Interactions between rail and other modes are also a safety concern noted in Oregon's planning and policy documents. Generally, the removal of at-grade crossings is a recommended strategy wherever possible, but this can have negative mobility impacts on pedestrians, bicyclists, transit, and motorists.

Data and Analysis

Data and analysis improvements are a recommended strategy in several of Oregon's transportation plans. These strategies are suggested as a way to improve the management of

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[4] U.S. Department of Health & Human Services. 'Step it Up! The Surgeon General's Call to Action to Promote Walking and Walkable Communities: Executive Summary.' Sep. 9, 2015. http://www.surgeongeneral.gov/library/calls/walking-and-walkable-communities/exec-summary.html

[5] American Public Health Association. Transportation and Public Health. https://www.apha.org/~/media/files/pdf/factsheets/140319transportation.ashx

various aspects of the transportation system, including safety performance. More accurate and timely data is essential, along with improved linkages between data systems. As discussed elsewhere in this memo, crash data is the primary source of information for safety problem identification and analysis, but other data can lead to a greater understanding and new perspectives on safety.

Enhanced Emergency Response

Emergency response is recognized as an essential aspect of safety management in the Oregon Transportation Plan and other Oregon plans. In the event engineering, education and enforcement do not work, emergency response is the last resource for saving lives or reducing the severity of injury. The timeliness and quality of emergency response can be a deciding factor in whether a person survives a crash. Better communications, training, planning, and equipment are needed to improve crash outcomes.

Safety Culture

The need to enhance and integrate safety across organizations, disciplines, and system users is a common theme in Oregon's planning documents. In addition to education of the traveling public, safety training for transportation planners, facility designers, rail operators, community leaders, school staff, and others is essential to achieving lasting improvements in safety. California's SHSP Executive Leadership designated traffic safety culture as a critical element for the SHSP. A special Traffic Safety Culture team has been formed and is meeting individually with each Challenge Area Team to help them more effectively address traffic safety culture issues in their strategies and actions.

3.0 Potential Data Sources for Selecting Emphasis Areas in Oregon

Several broad categories of data are relevant to SHSP development and implementation, including: crash data (crash type, time of day, reported injuries), injury surveillance (EMS response time, hospital length of stay, injury level), roadways (traffic volume, functional classification), vehicles (age, model, year, weight, type), drivers (age, gender), law enforcement (citations, convictions), and others (e.g., seat belt surveys, insurance data, demographics). Each of these plays a role in the overall SHSP process, but crash data is seen as the primary source for identification of emphasis areas. Data sources that may be used to inform the SHSP development process in Oregon (excluding crash, roadway, and traffic volume) are discussed below.

3.1 Pre-hospitalization and Trauma Data

Data from emergency medical services (EMS) providers (pre-hospitalization data) and trauma care professionals provide a wealth of information about injury outcomes beyond what can be included in a crash report. Injury assessments made by health care professionals are more accurate and detailed as compared to what an officer or citizen can provide. Furthermore, these data offer the potential to identify injuries that may not be evident immediately following a crash.

In addition to enhancing crash data, pre-hospitalization and trauma data could serve as a supplementary data source for crashes that are not reported to the Oregon crash database. Such crashes could include single bicycle crashes, bicycle-pedestrian crashes, or crashes that are not reported for other reasons, but that are entered into a pre-hospitalization or trauma database. For example, the 2003-2012 Oregon Trauma Registry Report indicates that 'non-traffic bicyclist injuries' (cyclists injured during activities not involving a motor vehicle) accounted for around 3.4 percent of the 84,099 total trauma patient injuries during that time period, or around 2,900 bicyclist injuries. By comparison, motor vehicle incidents involving a bicycle accounted for around 2 percent of the total, or around 1,600 trauma patient injuries. Further research could be conducted to translate these statistics into comparable 'serious (A) injury' totals, as used throughout the TSAP development process, but the example serves to illustrate that injury data can be leveraged to improve the overall understanding of the injuries that occur on Oregon's roadways. In addition, location data for unreported crashes (including pedestrian and bike crashes) may be determined from pre-hospitalization data.

Tables 3 and 4 offer a high-level comparison of mortality data obtained from the Oregon Health Authority's *Injury in Oregon* report and Oregon crash data (ODOT) for the TSAP. The comparison indicates that the data sources are largely consistent for fatality reporting, including reporting for pedestrians and bicyclists involved in crashes with motor vehicles. These systems use different data definitions and as such the comparison is not intended to indicate discrepancies between these sources, but rather to highlight different approaches to reporting transportation-related fatality and injury outcomes.

Table 3. Comparison of Motor Vehicle Traffic Deaths by Data Source (OHA and ODOT)

Year	Oregon Health Authority (Death Certificates)	TSAP Analysis (ODOT data)	Difference
2009	352	377	+25
2010	307	317	+10
2011	339	331	-8
2012	326	337	+11
2013	324	313	-11

2009-2013 Total	1,648	1,675	+27

Sources: Oregon Health Authority. Injury in Oregon: 2013 Injury Data Report; Crash Analysis for TSAP update, based on data provided by ODOT.

Table 4. Comparison of Motor Vehicle Traffic Mortality Rates (Deaths per 100,000 Population) by User Type and Data Source (OHA and ODOT)

Year	Motor Vehicle Mortality Rate (All Crashes)		Motorcyclist Mortality Rate		Pedestrian Mortality Rate		Bicyclist Mortality Rate	
	OHA	ODOT	OHA	ODOT	OHA	ODOT	OHA	ODOT
2009	9.2	9.9	1.4	1.4	1.0	1.0	0.1	0.2
2010	8.0	8.3	1.2	1.0	1.5	1.6	0.2	0.2
2011	8.8	8.6	1.0	1.0	1.3	1.2	0.3	0.4
2012	8.4	8.7	1.2	1.3	1.6	1.5	0.3	0.3
2013	8.2	7.9	0.8	0.8	1.4	1.3	0.1	0.1

Sources: Oregon Health Authority. Injury in Oregon: 2013 Injury Data Report; Crash Analysis for TSAP update, based on data provided by ODOT..

Pre-hospitalization and trauma care data are managed by the Oregon Health Authority (OHA). Oregon participates in a national EMS data standard called NEMSIS (National EMS Information Systems), which has established conventions for recording data consistently across EMS agencies. A high percentage of Oregon's EMS providers submit data through the NEMSIS protocol, including those in large metro areas.

Pre-hospitalization and trauma care data are currently available to ODOT and other safety partners on an as-needed basis from OHA. OHA can develop custom reports that answer questions such as: how many total and 'non-traffic' bicycle crash incidents were reported in a given year? Or, what was the average EMS response time in different ODOT regions or by injury outcome?

Through a more involved process, OHA and ODOT could work together to link crashes and pre-hospitalization or trauma data at the patient level. To use this data for transportation safety planning, there are a number of challenges that would need to be addressed, including privacy concerns, institutional arrangements, and technical barriers. Overcoming these challenges and working with ODOT to reduce fatal and serious injuries is a high priority for OHA. Furthermore,

FHWA recommends, but would not require, that by 2020 states use hospital records as the basis for reporting injury outcomes.[6]

3.2 Surveys

Well-designed and implemented surveys can inform transportation agencies of current safety problems and trends. There are several surveys relevant to transportation safety in Oregon that are conducted on a regular basis or that have been conducted recently. These include:

- Oregon Transportation Needs & Issues Survey: This survey of Oregon residents is conducted by ODOT roughly every two years. Safety-related topics include: perceptions of work zone safety, perceptions of safety when traveling by various modes, and the relative importance of funding safety projects vs. other types of transportation projects. Results from the FY2013 survey indicate that the public feels much safer driving than walking, bicycling, or using public transportation. In addition to current year results, the survey report includes historical results that can help to identify trends in safety perception.

- Oregon Occupant Protection Observation Study: Each year, the use of seat belts and child seats is measured through an observational study conducted by the ODOT Transportation Safety Division. Summary data indicates the percentage of observed occupants that use their safety belt or child seat. Separate totals are provided for different vehicle types and child age ranges. This data is provided in the annual Oregon Traffic Safety Performance Plan (see p. 54 of the FY2014 report). Safety belts and restraint use have been relatively consistent over the past few years at approximately 96 to 97 percent, though there is some year-to-year variation and differences within specific categories.

- In the preliminary work for the TSAP update, ODOT conducted an online survey to gain a better understanding of safety stakeholder perspectives. Results from this survey suggest the following topics as being the highest priorities for the TSAP update: distracted driving, pedestrian safety, bicycle safety, interactions between modes, intersections, and impaired driving.

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[6] 23 CFR Part 490. Federal Highway Administration. National Performance Management Measures; Highway Safety Improvement Program. Notice of proposed rulemaking. March 11, 2014. https://www.federalregister.gov/articles/2014/03/11/2014-05152/national-performance-management-measures-highway-safety-improvement-program.

- Youth Risk Behavioral Survey: The Centers for Disease Control (CDC) conducts a bi-annual survey of high school youth that assesses the degree to which they engage in various risky behaviors (Youth Risk Behavior Survey, YRBS). Oregon is one of only a few states that does not participate (it has participated in previous years, but not since 2007). The survey includes 5 questions related to transportation safety that address the following topics: bicycle helmet usage, seat belt use, drinking and driving, and texting while driving. Future participation in the YRBS would provide an additional data source related to the safety of high school students.

3.3 Law Enforcement Data

In addition to crash reports, law enforcement agencies collect citation data, which can shed light on where risky behaviors are occurring. Similarly, citizens can report drunk driving through a drunk driving hotline (1-800-24-DRUNK). Law enforcement data is more likely to be useful in developing strategies rather than for emphasis area selection.

3.4 Emerging Datasets

The shifting technology landscape has opened up new data sources with potential application to safety planning. The specifics of how these data may be used in the safety planning process have not yet been thoroughly explored, but it is likely that they are more relevant for strategy development or research. Additionally, the feasibility of working with these datasets would need to be tested in a pilot study before undertaking a statewide data analysis. A few examples of emerging data are discussed below.

- Cell phone and GPS tracking data: Location data from cell phones and GPS devices offers potential for better understanding of traffic patterns as well as bicycle route choices. Traffic data gleaned from cell phone signals are available for transportation agencies to purchase, but the immediate applicability of this data for statewide safety planning purposes is unknown. It is likely to be useful at the project or corridor level. GPS data that show popular bike routes could be useful for understanding exposure; it is unclear whether such data sources are representative of all bicycle trips.

- Pedestrian and Bicycle Volume and Exposure Data: Accurate and reliable pedestrian and bicycle volume and exposure estimates are not currently available at a statewide level, but several efforts are underway to address this problem. Researchers at Portland State University are developing protocols for standardizing the collection and storage of pedestrian and bicycle count data in Oregon. Along with this, data from the Oregon Travel and Activity Survey includes information on walking and biking trips (along with other modes) that could be used to estimate trips at a regional or statewide level through a modeling approach. Both of these efforts are important steps toward being able to estimate

the level of bicycling and walking, which in turn sheds light on the relative safety risk associated with the use of these modes, but it may be several years before reliable statewide or even regional pedestrian and bicycle exposure estimates can be developed.

- Crowdsourced Data: Many public agencies have begun to use information generated from citizens to inform them of safety concerns. For example, a mobile app called 'iBikeEugene' has been developed to allow bicyclists to notify the City of Eugene about bicycle safety and maintenance issues. Similarly, the Portland Water Bureau encourages residents to notify them of bicycling hazards related to leaking hydrants, missing vault covers, and other hazards. Reporting of close calls or near misses is another source of bike safety information. The Bike Portland website encourages the public to report these situations on their website.

- Social media: Social media are used to promote safety messaging, but there is also potential to understand traffic safety problems through social media. For example, 'mining' of social media data, such as Twitter feeds, could enable researchers and practitioners to better understand public perceptions about risky behavior or other transportation safety issues.

4.0 Emphasis Area Selection Framework for Oregon

Based on the considerations and data sources discussed above, a framework for selecting EAs is proposed in this section. The criteria for consideration are as follows:

Quantitative Criteria

- Frequency: total number of fatal and serious injury crashes (2009-2013).

- Severity: number of fatal and serious injury crashes per 100 total crashes (2009-2013).

- Trend: trend line slope for fatal and serious injury crashes (2009-2013).

Implementation Considerations

- Effectiveness Data: are there proven countermeasures available for use in Oregon? If not, is there an ability and commitment to evaluate effectiveness of programs and projects?

- Institutional capacity: are there agencies or individuals who are able to commit ongoing staff resources to address this safety problem?

- Emphasis Area Overlap: does the potential emphasis area significantly overlap with other potential emphasis areas and, if so, can they both be addressed simultaneously?

Policy Focus

- Is the potential EA consistent with other state plans and policies and does it address a significant policy goal? If not, does the potential EA push the state in an appropriate policy direction?

To apply this framework, each potential EA would be scored as strong, moderate or weak for each criterion. The outcomes would be studied and a subset selected. Options for grouping EAs could also be considered at this point. The results of the EA scoring process are intended to inform the decision-making process, rather than to serve as a final decision tool. Ideally, EAs will be selected through the consensus of the PAC, where the selection framework can serve as an important input.

Based on the PMT Plus discussion on Thursday September 4, the CS team will score all categories (started in Table 4) and provide the results to PMT Plus and subsequently to the PAC for review. CS will use the results from the crash data analysis to score the frequency, severity, and trend categories, along with our best judgment and findings from the research conducted for this memo to evaluate the qualitative criteria. From this assessment CS will propose optional EAs or categories of EAs for consideration by the PMT Plus and subsequently the PAC.

Table 5. Draft Emphasis Area Selection Framework

Potential Emphasis Area	Frequency	Severity	Trend	Effectiveness Data	Emphasis Area Overlap	Institutional Capacity	Policy Focus
Aggressive Driving	■	○	◐	Information to be determined from stakeholder input.			
Alcohol (No Drugs)	◐	■	■				
Alcohol and/or Other Drugs	◐	■	■				
Bicycles	○	◐	○				
Commercial Vehicles	○	◐	○				
Inattentive Drivers	○	○	○				
Intersections	■	○	■				
Motorcycles	◐	■	◐				
Older Drivers (65+)	◐	○	◐				
Pedestrians	○	■	◐				
Roadway Departure	■	◐	■				
Speed-Related	■	◐	○				
Unlicensed Drivers	○	◐	■				
Unrestrained Occupants	◐	■	○				
Young Drivers (15-25)	■	○	◐				
Data and Analysis	N/A						
Emergency Medical Services							

Legend and Notes

■	Strong Emphasis Area Candidate
◐	Moderate Emphasis Area Candidate
○	Weak Emphasis Area Candidate

Frequency = number of fatal and serious injury crashes from 2009 to 2013; Severity = fatal and serious injury crashes per 100 total crashes; Trend = regression trend line slope for fatal and serious injury crashes from 2009 to 2013; Effectiveness Data = proven, effective countermeasures are known, or projects and programs can be evaluated for effectiveness; Emphasis Area Overlap = the potential EA significantly overlaps with one or more other potential emphasis areas; Institutional Capacity = there are existing programs and resources to support implementation of strategies related to this potential EA; Policy Focus = the potential EA represents a significant policy focus for Oregon;

Appendix A. Emphasis Area Crash Frequency and Severity Data

Table A-1. Potential Emphasis Areas Ranked by Fatal and Serious Injury Crash Frequency (2009-2013)

Rank	Potential Emphasis Area	Fatal and Serious Injury Crashes
1	Roadway Departure Crashes	4,103
2	Aggressive Driving Involved	2,767
3	Intersection Crashes	2,633
4	Young Drivers - 15-25 Involved	2,366
5	Speed-Related Crashes	2,067
6	Alcohol and/or Other Drugs Involved	1,695
7	Older Drivers - 65+ Involved	1,548
8	Alcohol Involved (No Drugs)	1,445
9	Motorcycle Involvement	1,170
10	Unrestrained Occupants	1,029
11	Pedestrian(s) Involved	770
12	Unlicensed Drivers Involved	603
13	Inattentive Drivers Involved	350
14	Pedalcycle(s) Involved	334
15	Commercial Motor Vehicle Involved	322

Source: Crash Analysis for TSAP update, based on data provided by ODOT.

Table A-2. Potential Emphasis Areas Ranked by Fatal and Serious Injury Crashes per 100 Total Crashes (2009-2013)

Rank	Potential Emphasis Area	Fatal and Serious Injury Crashes	Total Crashes	Fatal and Serious Injury Crashes per 100 Total Crashes
1	Motorcycle Involvement	1,170	4,831	24.2
2	Unrestrained Occupants	1,029	5,205	19.8
3	Pedestrian(s) Involved	770	4,077	18.9
4	Alcohol and/or Other Drugs Involved	1,695	11,990	14.1
5	Alcohol Involved (No Drugs)	1,445	10,798	13.4
6	Unlicensed Drivers Involved	603	8,102	7.4
7	Roadway Departure Crashes	4,103	56,488	7.3
8	Pedalcycle(s) Involved	334	4,694	7.1
9	Speed-Related Crashes	2,067	35,627	5.8
10	Commercial Motor Vehicle Involved	322	6,829	4.7
11	Older Drivers - 65+ Involved	1,548	41,139	3.8
12	Inattentive Drivers Involved	350	11,668	3.0
13	Young Drivers - 15-25 Involved	2,366	84,024	2.8
14	Aggressive Driving Involved	2,767	107,301	2.6
15	Intersection Crashes	2,633	109,460	2.4

Source: Crash Analysis for TSAP update, based on data provided by ODOT.

Appendix B. SOURCES

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- Portland Water Bureau. *Make Your Bike Ride Safer by Reporting Road Hazards.* https://www.portlandoregon.gov/water/article/410440
- U.S. Code, Title 23. http://www.fhwa.dot.gov/map21/docs/title23usc.pdf
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- Washington State. Target Zero: Washington's Strategic Highway Safety Plan. 2013.

Appendix C. Safety Planning in Oregon Transportation Plan and Supporting Topic and Mode[7] Plans[8]

Plan	Goal	Policy Level	Strategies/Actions	TSAP Issue Areas
Oregon Transportation Plan (OTP)	Goal 5 - Safety and Security: Plan, build, operate and maintain the transportation system so that it is safe and secure	5.1 Improve safety for all modes, facilities, users	5.1.1 Improve Leadership	Collaboration, education
			5.1.2 Develop a Strategic Highway Safety Plan	
			5.1.3 Safety at all stages of system management	Culture, infrastructure
			5.1.4 Interoperable communications for responders	EMS. enforcement, collaboration
			5.1.5 Appropriate laws, strategic enforcement	Legislation
			5.1.6 Awareness, education and training programs	Education
			5.1.7 Urban and rural emergency services: supplies, training, facilities.	EMS; safe communities
			5.1.8 Safe transport of hazardous materials	Hazardous Materials
			5.1.9 Reliable, comprehensive, timely, accessible transportation safety data system	Data
	OTP Key Initiatives	B. Optimize system capacity and safety through information technology and other methods.	(3 of 4) Safe, efficient and seamless transportation system for transit, truck and passenger vehicles.	Culture, infrastructure
			Enhance incident/emergency response to maintain safety and system capacity.	EMS
			Improve emergency response, education, enforcement and infrastructure to reduce crashes.	Incident Management, Collaboration
Freight Plan	(Plan is not organized around Goals)	Issue 6. Move freight throughout the state as safely as	Strategy 6.1: Partner stakeholders to manage the safety performance of the statewide freight system.	Collaboration
			Strategy 6.2: Use state-of-the-art data to monitor the safety performance of the	Data, technology

[7] The Public Transit Plan is not included because it does not specifically address safety.

[8] The language in the matrix has been excerpted. For complete language and related background narratives you can look up plans at: http://www.oregon.gov/ODOT/TD/TP/Pages/Plans.aspx

Plan	Goal	Policy Level	Strategies/Actions	TSAP Issue Areas
		possible to improve safety in Oregon communities and protect the environment	system over time.	
			Strategy 6.3: Consider freight safety in system monitoring and project selection.	Culture, infrastructure
		Issue 10. New and emerging safety, and security regulations, can be confusing and expensive to implement.	Strategy 10.1: Work with freight stakeholders; increase knowledge the costs, consequences, requirements of new safety and security regulations.	Education, technology
Rail Plan	**Goal 3 – System Investments and Preservation** Invest in preservation and improvement of rail assets and infrastructure	3.2 Preserve rail system service, infrastructure and assets to meet existing objectives and capitalize on future opportunities.	3d. Eliminate at-grade crossings where possible; prioritize crossings with high conflicts with other modes; consider of importance of crossings for local pedestrian, bicycle or vehicle circulation.	Funding, infrastructure, safe communities
	Goal 5 - System Safety: Plan, construct, operate, maintain and coordinate the rail system in Oregon with safety and security for all users and communities as a top priority	5.1 Improve rail system safety and security for all users and affected communities	5a. Support safety awareness, operational improvements, new technology, equipment, inspections, enforcement and response plans and training for system safety	Education, engineering, technology, enforcement
			5b. Improve safety for rail system employees, passengers, nearby communities and commodities being transported.	Safe communities, resilience
			5c. Work with railroad operators, state, federal and local jurisdictions, and emergency response providers for safe and secure transport of commodities including hazardous materials.	Collaboration, EMS, incident response
			5d. Manage potential conflicts between rail and other users; consider Quiet Zones when feasible and safe.	Safe connections, safe communities
			5e. Address safety concerns with at-grade or grade separated crossings in project design; coordinate with ODOT Rail and Transit Division.	Infrastructure, collaboration
	Goal 2: System	**Policy 2F** Improve safety	Action 2F.2 If safety is the objective of a project, include goals and evaluation of	Infrastructure, safety culture,

Plan	Goal	Policy Level	Strategies/Actions	TSAP Issue Areas
	Management Create an increasingly seamless transportation system that (among other things) Enhances system efficiency and safety.	for all users of the highway system via engineering; education, enforcement, emergency medical services solutions.	outcomes to further refine project selection and solutions.	evaluation
			Action 2F.3 Identify solutions to traffic safety problems, considering: more enforcement; educational efforts; special signings; engineering improvements; bicycle and pedestrian improvements; managing highway access; incident response; traffic control devices; and driver information systems.	Enforcement, education, infrastructure, engineering, safe communities, incident response, IS
			Action 2F.4 The Safety Management System: target resources to sites / routes with significant safety problems. Encourage local governments to adopt a safety management system.	Funding, collaboration
			Action 2F.5 Seek additional funding for state and local traffic law enforcement.	Funding, enforcement
			Action 2F.6 Work with citizens and local jurisdictions to address highway safety concerns.	Collaboration
		Policy 2G Increase safety and transportation efficiency through the reduction and prevention of conflicts between railroad and highway users (related to System Efficiency, Safety, and Mobility)	Action 2G.1 Eliminate crossings at grade wherever possible, prioritizing high conflict areas. Consider routes important to local pedestrian, bicycle, or vehicle circulation.	Intermodal, safe communities, collaboration
			Action 2G.2 Design highway projects to avoid or reduce rail crossings at grade.	Infrastructure
			Action 2G.3 With railroads and local government, target resources to increase safety through automated devices and enforcement at specific crossings.	Collaboration, funding, technology, enforcement
			Action 2G.5 Address pedestrian and bicycle access issues and related design concerns when designing grade-separated crossings.	Intermodal, infrastructure
Highway Plan	**Goal 3: Access Management** Employ access management strategies to ensure safe and efficient highways.	**Policy 3A** Manage location, spacing and type of intersections and approach roads on state highways to assure the safe and efficient operation of state highways	Action 3A.3 Manage the location and spacing of traffic signals on state highways to ensure the safe and efficient movement of people and goods.	Infrastructure, technology, intermodal
			Policy 3C Plan for and manage grade-separated interchange areas to ensure safe and efficient operation between connecting roadways	Infrastructure

Plan	Goal	Policy Level	Strategies/Actions	TSAP Issue Areas
	Goal 4: Travel Alternatives Optimize efficiency, utility of the state highway system through alternative modes, travel demand management		Action 4A.2 Encourage uniform commercial vehicle regulations at the regional and national levels which might include regulation regarding vehicle design.	Legislation, new technology
Transportation Options (TO) Plan (OTOP)	**GOAL 1**: Provide a safe transportation system through investments in education and training for roadway designers, operators, and users of all modes.	1.1 Improve safety for all facility users to make each modal option more safe and attractive to prospective users	1.c Identify funds to expand K-12 school safety programs using the Safe Routes to School program model	Funding, education, modal connections
			1.e Adopt **"safety in numbers"** as a core principle for transportation system planning, design and operations.	Safe communities
			1.f Target education campaigns to safety for all modes and promote safe access	Education, safe communities
		1.2 Raise awareness of the availability of transportation options through the integration of road safety education for all modes into classroom and through lifelong learning, including traffic diversion programs and community programs such as Safe Routes to Schools, Drivers Education, licensing renewals, and community cycling	1.a Develop or enhance statewide safety education materials for all facility users and partnerships for distribution, including interest groups, public health groups, insurance companies	Education
			1.b Promote training curricula for traffic engineers, planners, developers, and others achieve a system that safely accommodates all users and all modes	Education, safe communities
			1.d During project development balance efficient multimodal travel and safety	Engineering, infrastructure

Plan	Goal	Policy Level	Strategies/Actions	TSAP Issue Areas
		workshops		
	Goal 7: Ensure planners, developers, and decision makers have tools and strategies to implement livable development patterns by supporting access to transportation options.		**7.n** Increase availability of secure bicycle parking.	Safe communities
	GOAL 10: Provide easily accessible information about the full range of transportation options available		**10.j** Support peer-to-peer travel training programs to encourage safe travel and new users. Target for Limited English Proficiency (LEP) populations and new residents, employees, or students.	Education, safe communities
Bicycle and Pedestrian Plan (Currently in Effect)	**GOAL 4:** Provide safe, accessible and convenient bicycling and walking facilities to support increased levels of bicycling and walking	**ACTION 1:** Provide bikeway and walkway systems that are integrated with other transportation systems.	**STRATEGY 1A**. Integrate bicycle and pedestrian facility needs into all planning, design, construction and maintenance activities, state and local.	Infrastructure, engineering, all roads, culture
			STRATEGY 1B. Retrofit existing roadways with paved shoulders or bike lanes for bicyclists, and sidewalks / safe crossings for pedestrians.	Safe communities, infrastructure
			STRATEGY 1C. Help local governments improve bikeway and walkway projects on local streets.	Culture, infrastructure
		ACTION 2: Create a safe, convenient and attractive bicycling and walking environment.	**STRATEGY 2A.** Adopt design standards for bicycling and walking facilities.	Infrastructure
			STRATEGY 2B. Uniform signing and marking of bikeways and walkways.	Infrastructure, safe communities
			STRATEGY 2C. Maintenance practices to preserve bikeways and walkways in a clean and safe condition.	Culture, safe communities
		ACTION 3: Develop education	STRATEGY 3A. Use bicyclist and pedestrian crash data to improve bicyclist and pedestrian safety.	Data

Plan	Goal	Policy Level	Strategies/Actions	TSAP Issue Areas
		programs that improve bicycle and pedestrian safety.	STRATEGY 3B. Publish bicycling and walking maps and guides.	Education, safe communities
			STRATEGY 3C. Bicycling and walking safety education programs to improve skills, knowledge of traffic laws.	Education
			STRATEGY 3D. Safety education programs for motor vehicle drivers to improve awareness of bicyclists and pedestrian rights and needs.	Education
Bicycle and Pedestrian Plan (NOT IN EFFECT: this is draft language from an early draft in the current update process)	Goal 1: Eliminate bicycle and pedestrian fatalities and serious injuries, and improve the overall sense of safety of those who bike or walk	Policy 1.1: Provide safe and well-designed streets and highways to accommodate a variety of users.	Strategy 1.1A: Improve ODOT Design Guidelines and Highway Design Manual; identify best practices for bicycle and pedestrian facilities.	Infrastructure, engineering
			Strategy 1.1B: Develop roadway cross sections in context re: vehicle speeds, facility type, land use, and the safety and comfort of all users.	Infrastructure, safe communities
			Strategy 1.1C: Develop best practices and guidance for illumination to improve visibility of bicyclists and pedestrians.	Safe communities
			Strategy 1.1D: Improve visibility by assuring adequate sight distance, bulb outs, advanced stop bars, bike boxes, etc.	Safe communities
			Strategy 1.1E: Reduce pedestrian exposure time by minimizing the number of lanes crossed or using bulb outs, pedestrian islands, etc.	Infrastructure, safe communities
			Strategy 1.1F: Implement best practices for reducing motor vehicle speed through roadway design such as intersection geometrics, lane / roadway width, on-street parking, other visual cues.	Culture, infrastructure, safe communities
			Strategy 1.1G: Study methods for changing the way posted speeds are determined for different locations and facilities, recognizing the need to balance multimodal interests.	Culture, safe communities
			Strategy 1.1H: Pay attention to emerging technologies to improve pedestrian or bicycle safety.	Technology
			Strategy 1.1I: Consider changes to safety project prioritization processes to improve analysis of crashes involving bicyclists and pedestrians and other data sources.	Culture, infrastructure
			Strategy 1.1J: Use bicycle and pedestrian	Data

Plan	Goal	Policy Level	Strategies/Actions	TSAP Issue Areas
			crash and proxy data to identify high crash corridors and crash typologies for further analysis and prioritization.	
		Policy 1.2: Educate travelers on the rules of the road to promote understanding of legal rights and responsibilities and how all modes and users can safely and courteously interact with each other.	Strategy 1.2A: Target education and outreach on rules of the road; improve or develop materials to address targeted audiences; seek creative distribution and partnerships to distribute.	Education, collaboration
			Strategy 1.2B: Educate motorists on the risks of distracted driving, impaired driving, and speeding to bicyclists and pedestrians.	Education
			Strategy 1.2C: Target educational materials that support safe behaviors by bicyclists and pedestrians. Deliver materials through Safe Routes to School, transportation options and other programs, new partnerships and methods.	Education, collaboration
			Strategy 1.2D: Consider how to accommodate skateboarders, rollerbladers, and other means of transportation.	Safe communities
			Strategy 1.2E: Provide information on how to safely operate scooters, skateboards, motorized personal vehicles, etc. on the bicycle and pedestrian system	Education
			Strategy 1.2F: Provide information on how to safely bike or walk when new technologies are deployed or innovations constructed.	Education, technology
		Policy 1.3: Encourage the development and sustainability of Safe Routes to School type programs through funding, partnerships, model programs and other technical assistance.	*Strategy 1.3A*: Fund Safe Routes to School programs.	Funding, safe communities
			Strategy 1.3B: Maintain partnerships with the ODE and OHA to implement Safe Routes to School programs.	Collaboration
			Strategy 1.3C: Inform school districts about Safe Routes to School eligible activities.	Safe communities, collaboration
		Policy 1.4 Encourage bicycle and pedestrian users by providing a	Strategy 1.4A: Encourage sufficient secure and convenient bicycle parking at key destinations.	Safe communities
			Strategy 1.4B: Enhance personal security for bicycles and pedestrians with good lighting, visibility, wayfinding, efficient access.	Safe communities

Plan	Goal	Policy Level	Strategies/Actions	TSAP Issue Areas
		safe system that includes elements to enhance supports personal security.	Strategy 1.4C: Enforcement of local codes and laws that enhance personal security.	Culture
			Strategy 1.4D: Enforcement of laws that relate to bicycle and pedestrian safety and security.	Enforcement
		Policy 2.2	2.2.c Reduce barriers to crossing major facilities through cost effective and innovative solutions.	Infrastructure
			2.2.d Use best practices for crossing improvements in high use areas, transit corridors, etc.	Infrastructure, engineering
			2.2.f Ensure safe and convenient connections for bicyclists and pedestrians on bridges and viaducts.	Infrastructure, culture
		Policy 2.3	2.3.d Improve bicycle and pedestrian connections to modes such as airports, train stations and intercity bus stations.	Infrastructure
		Policy 3.2	3.2.b Use a systems approach to prioritizing investments for bike and pedestrian facilities and use the safest, best connected routes.	Safe communities
			3.2.d Provide safe, alternative s, clear signage for bicyclists and pedestrians during construction, with outreach communications including these route options.	Construction, culture, education
			3.2.e Program maintenance activities to include considerations for bicycle and pedestrians facility needs.	Culture, infrastructure
		Policy 3.3	3.3.b Research best practices for design treatments tthat safely accommodate bicyclists and pedestrians and freight carrying capacity, separating without constraining either mode.	Culture, infrastructure
		Policy 4.1	4.1.c Coordinate with schools to provide safe and accessible walking and bicycling facilities (20 year plan)	Safe communities
		Policy 5.1	5.1.b Encourage Safe Routes to School projects (both education and infrastructure) to address "Title 1" designated schools.	
		Policy 8.2	8.2.b Continue to invest in Safe Routes to Schools program.	
		Policy 8.3	8.3.b Prioritize maintenance activities such as sweeping, pavement preservation, etc. that contribute to bicycle and pedestrian use.	
		Policy 9.1	9.1.c Identify alternative bicycle and walking	

Plan	Goal	Policy Level	Strategies/Actions	TSAP Issue Areas
			routes on parallel local roadways or facilities on local roads where the ODOT facility raises safety concerns, there are gaps or conflicts; or the alternate route is preferred locally.	