Chapter 321 Safety Analysis

321.01 Safe System Related Policy

The Washington State Strategic Highway Safety Plan, "Target Zero" has a vision to reduce traffic fatalities and serious injuries to zero by 2030. WSDOT is pursuing this goal along with partners such as Washington State Patrol (WSP) and Washington Traffic Safety Commission (WTSC). WSDOT recognizes that potential for crashes exists in all modes of transportation. The universal objective is to reduce the potential for fatal and serious injury crashes within the limits of available resources, science, technology, and legislatively mandated priorities.

The *Secretary's Executive Order E 1085.01, Road Safety – Advancing the Safe System Approach for All Users*, potential and network connectivity for vulnerable road users. This acts to proactively reduce fatal and serious injury crashes through multimodal facility, safety, and operational improvements. Where proactive reduction is not feasible, provide mitigation to reduce crash severity and propose future solutions to further reduce the potential for fatal and serious crashes.

321.01(1) Design and the Safe System Approach (New 2024)

The Safe System Approach to road safety is a holistic approach based on the following elements: safer land use, safer roads, safer speeds, safer vehicles, safer road users, and post-crash care. In the Safe System Approach, WSDOT has a primary responsibility of road infrastructure planning, design, and operations. This includes speed management, multimodal context-sensitive geometric design, traffic systems management and operations, roadside features and road user actions affected by road infrastructure design and operations (such as signage, lighting, and striping), and the safety management systems that support analysis and decision making.

This sets the expectation of those planning, designing and operating the highway to consider the land use interaction, context, modal priorities, and design and operating speeds of facilities as part of planning, design and operations processes, as well as effective approaches to reduce the potential exposure/conflicts, crash likelihood, and severity of crashes. The exposure/conflicts between traffic refers to how volumes of different user types, crossing (conflicts) points between these user types and how it is managed through separation in space and/or time (e.g., crossing widths, time and distance to cross for active transportation, intersection size). The crash likelihood refers to the potential that a crash can occur given roadway, vehicle and road users' characteristics. Severity of crashes refers to the combination of factors that can lead to increased severity, including speed, mass, angle, and protection of the occupant or active transportation user in the crash.

Safety increases as exposure/conflicts, the likelihood of crashes, and/or the severity of crashes are reduced.

Understanding severity is critical in the Safe System Approach. The Safe System Approach directly addresses the fact that, by reducing kinetic energy, crash severity is reduced. Injuries occur when crash forces are greater than a human can withstand. It is important to understand that:

$$\textbf{Kinetic Energy} = (^1/_2) \times \textbf{Mass} \times \textbf{Velocity}^2$$

This means that vehicle speed is a significant factor in crash severity given its exponential effect (velocity x velocity). Small increases or decreases in speed can change the crash kinetic energy or injury potential substantially.

321.02 HQ Safety Technical Group

The HQ Safety Technical Group is comprised of experts in safety analysis. The team has several duties including recommendations for maintaining the Safety Analysis Guide, supporting safety analysis training, reviewing complex safety analysis, and recommending approval for crash modification factors. The team can also provide assistance to a project office or region as they conduct safety analysis.

321.03 Project Related Safety Analysis

All projects are required to evaluate the need for a safety analysis for Design Approval (see Chapter 300). The safety analysis is intended to be scalable. The Safety Analysis Guide provides direction on the scope and scale of the safety analysis for each funding subprogram (i.e. I-1, I-2, P-3) and each document needing a safety analysis (i.e. Design Analyses, Access Revision Reports (ARRs), Intersection Control Evaluations (ICEs)). Contact the Headquarters Transportation Safety Office if your project is not covered by the Safety Analysis Guide or if you have questions regarding how to use the guide. The Crash Analysis Reports, (CAR), Intersection Control Evaluation (ICE), and Basis of Design (BOD) are described in Sections 321.03(1), 321.03(2), and 321.03(3). For approval requirements of these documents, refer to Exhibit 300-3.

321.03(1) Crash Analysis Report

A Crash Analysis Report (CAR) is developed during the scoping phase for I-2 Crash Reduction projects and is required for funding to be released. Contact Headquarters Transportation Safety Office for a copy of the latest version of the CAR template.

Projects with an approved CAR may, in some cases, be exempted from the requirement to prepare a Basis of Design (see Chapter 1100.)

321.03(2) Intersection Control Evaluation

Projects that require an Intersection Control Evaluation (ICE) need to do a safety analysis on the alternatives. If a project has a completed CAR, the ICE may reference this CAR. If not, the safety analysis for the ICE should have a scale and scope associated with its funding source as noted in the Safety Analysis Guide.

321.03(3) Basis of Design

The Basis of Design (BOD) utilizes metrics and targets in the baseline and contextual needs. If the chosen metric is safety related utilize a safety analysis to determine the potential for crash reduction for various alternatives. The safety analysis may also be used as a component in the Alternative Comparison Table (ACT) to allow easier comparison across alternatives. The scale and scope of a safety analysis for a BOD is associated with its program type and is explained in the Safety Analysis Guide.

321.04 References

321.04(1) Federal/State Directives, Laws, and Codes

23 United States Code (USC) 148 – Federal requirements for the Highway Safety Improvement Program (HSIP)

Revised Code of Washington (RCW) 47.05.010 – The statement of purpose for priority programming of transportation projects

Secretary's Executive Order 1085 – Sustainable Highway Safety Program

Secretary's Executive Order 1090 – Moving Washington Forward: Practical Solutions

321.04(2) Design Guidance

Safety Analysis Guide, WSDOT; See Sustainable Highway Safety Tools here:

Safety Analysis Guide (wa.gov) (PDF)

Highway Safety Manual (HSM), AASHTO, 2010

A Policy on Geometric Design of Highways and Streets (Green Book), AASHTO, 2011

321.04(3) Supporting Information

Strategic Highway Safety Plan: Target Zero – Washington State´s strategic traffic safety plan developed by the Washington Traffic Safety Commission: Target Zero

Design guidance and Support Web Page – Contains all of the procedures and tools to implement highway safety: Design - Support | WSDOT (wa.gov)

Active Transportation Plan

Washington Transportation Plan – Washington State Transportation Commission´s recommended strategic transportation plan; includes a highway safety element: Safety | Policy, Vision & Recommendations (wtp2040andbeyond)

Washington Highway System Plan