Oregon Department of Transportation

Research Stage 1 Problem Statement

Number 26-40 – "Development of a Safe Systems Evaluation Tool Focused on the Policies and Procedures Used By ODOT Staff"

1. Concisely describe the **transportation issue** (including problems, improvements, or untested solutions) that Oregon needs to research.

With increases in fatal and serious injury crashes, particularly with vulnerable road users, the U.S. DOT has adopted the Safe System Approach as part of the National Roadway Safety Strategy. A majority of state DOTs have begun some form of implementation of the Safe System Approach due to similar crash trends within their jurisdiction, with many DOTs explicitly discussing the Safe System Approach in Strategic Highway Safety Plans, Active Transportation Plans/Safety Assessments, and in roadway design manuals. While Oregon does not have a Safe System guide or manual, Oregon does reference this approach in the aforementioned documents with varying levels of guidance; therefore, additional information is needed on how to implement the Safe System Approach effectively. This new guidance is especially important for Oregon given recent crash trends. The guidance developed as a part of this research can help ensure that the Safe System Approach is consistent agency wide. In ODOT's 2022 *Traffic Crash Summary* report, it is reported that 2022 saw more fatalities (603) than in the previous four years, and this upward trend in fatalities was especially pronounced for pedestrians. With its emphasis on proactive crash prevention, the Safe System Approach will help ODOT achieve its traffic safety goals, and that the Transportation Safety Action Plan is applied in alignment with the Safe System Approach.

2. What **final product or information** needs to be produced to enable this research to be implemented?

ODOT's Transportation Safety Action Plan is focused on changing safety culture and proactively planning, designing, operating, and maintaining a transportation system that eliminates fatalities and serious injuries. The Safe System Approach calls for strengthening every part of the transportation system with safer roads, safer vehicles, safer speeds, safer road users, and post-crash care to create an overlap of countermeasures that prevent death and serious injury. To do so requires a thorough understanding of how the Safe System Approach can be implemented in the most effective manner. Such understanding from planning, design, and operations is necessary to improve decision making in ways that reduce the potential for fatal and serious injury crashes. This research will focus on the decision-making processes and practices used by ODOT staff and will provide tools to enable this understanding. Specific applications may include countermeasure selection, planning application, and project prioritization.

This research will aim to produce a knowledge base, methods and tool to implement the Safe System approach to road safety. Many Safe System evaluation methods are available such as SSI (Porter et al., 2021), the Safe System Assessment Framework (Turner et al., 2016), the Safe System SUP Crossing Evaluation tool (Kumfer et al., 2023), the kinetic energy management model (Corben et al., 2010), SafeTIA (Combs et al., 2022), and other related methodologies, like the 20 Flags Method (National Academies of Sciences, Engineering, and Medicine, 2021) or systemic safety analysis procedures (Thomas et al., 2018). The team will develop a Safe Systems evaluation tool that will

synthesize some of these methods and also others such as Level of Traffic Stress (LTS) or Route Directness (RDI) and a guidebook that details the uses of the tool. The tool will be specifically focused on the policies and procedures used by ODOT staff. The research team will work closely with ODOT staff to narrow the focus of the tool (i.e., the tool will be calibrated to project prioritization steps or will be designed to intake crash and other data to support Safe System-based designs during the planning stage of projects).

3. (Optional) Are there any individuals in Oregon who will be instrumental to the success of implementing any solution that is identified by this research? If so, please list them below.

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Christina McDaniel-Wilson	State Traffic Safety Engineer	Christina.A.MCDANIEL-WILSON@odot.oregon.gov	503.986.3573
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4. Decision making lenses

Please complete the following three sections. Your answers to these questions will be applied on a programmatic basis to support agency decisions. Answering yes to the questions below is not required. Resolving a narrowly focused technical research problem may meet agency needs without answering yes to any of the following questions. The ODOT Research Section will seek a balanced portfolio some projects will answer yes to one of the three categories below (e.g. climate, equity, and/or safety) and other projects in a different category.

We are looking for an overall program balance and no one project is expected to balance all categories. Generally, a research problem statement is expected to be able to answer yes with clear and verifiable information in only one of the three categories below, some projects may be able to answer yes in two or even three categories. Some projects (i.e. needs focused on specific elements of infrastructure design), may have no yes answers but may still be high value research need.

Climate

Oregon recognizes the climate crisis and makes systemic changes to reduce emissions caused by travel. Every mile driven in Oregon is powered by a clean source of fuel. We seek research that supports construction and maintenance operations are carbon neutral and investments in mobility that support travel by low and no emission modes. While every research project may not result in a reduction in emissions, transportation investments overall support emission reductions to achieve state goals. Oregon envisions a transportation system that is resilient in the face of seismic and climate events and impacts to the degradation of the natural environment are reduced. Our vision includes a transportation infrastructure is built in a way that avoids impacts on key habitat and results in better environmental conditions for wildlife and native vegetation. For definitions and details please review the equity vision, goals, and objectives of the ODOT Strategic Action Plan and Oregon Transportation Plan.

4f. Will addressing the **transportation issue** identified as a need in Question 1 develop, or validate methods for the estimation, measurement, or monitoring of transportation generated greenhouse gasses (GHG)?

☐Yes ☐No ☐Unsure

4g. If climate or GHG is not the focus of this **transportation issue** identified in this problem statement, will the research apply a GHG analysis to transportation infrastructure, planning, operations, maintenance, or materials?

☐Yes ☐No ☐Unsure

4h. Will the addressing the **transportation issue** include development or testing of construction practices, methods, or materials to establish potential reductions in greenhouse gas emissions?

☐Yes ☐No ☐Unsure

4i. Will the solving the **transportation issue** in question 1 study or support the reduction of vehicle miles traveled and single occupancy vehicle travel or support transition to electric vehicles (or other types of zero emission vehicles) or low-carbon alternative fuels?

☐Yes ☐No ☐Unsure

4j. Will the solving the **transportation issue** in question 1 lead to work that will support, measure, monitor, transportation system resilience in response to expected climate events, effects, or natural disasters in general?

☐Yes ☐No ☐Unsure

4k. Will the solving the **transportation issue** in question 1 lead to work that may result in better environmental conditions for wildlife and native vegetation ?

☐Yes ☐No ☐Unsure

4l. If you answered yes to any of the climate questions above or can provide alternative details related to climate, please provide additional information:

Due to pedestrians' and bicyclists' particularly vulnerability to death and serious injuries when motor vehicle crashes occur, much of the Safe System research is focused on improving safety for these road users. Safe System practices can lead to better pedestrian and bicyclist facilities, as well as increases in speed management efforts and reductions in operating speeds. These designs together can both lead to modal shift toward active transportation and reduced congestion and land use dedicated to motor vehicles. We cannot definitively state the project's outcomes can be used to achieve climate goals, but the changes to infrastructure that will support safety may also support climate outcomes.

Equity

Equity can have many dimensions and impacts relating to communities, and transportation. It is important that problem statement proposals clearly explain in what capacities are equity dimensions or impacts being examined within problem statements. It is a goal of the OTP to "Improve access to safe and affordable transportation for all, recognizing the unmet mobility needs of people who have been systemically excluded and underserved. Create an equitable and transparent engagement and communications decision-making structure that builds public trust". Proposed research may have the intent of studying elements of this goal or apply analysis to specific transportation topics to ensure the resulting research recommendations is consistent with our equity goals. For definitions and details please review the equity vision, goals, and objectives of the ODOT Strategic Action Plan and Oregon Transportation Plan.

4a Is the **transportation issue** identified as a need in Question 1 specifically focused on transportation equity?

☐Yes ☐No ☐Unsure

4b If the **transportation issue** is not focused on transportation equity, will the primary topic be assessed for equity benefits or impacts within the research project?

☐Yes ☐No ☐Unsure

4c Is the implementation of potential findings from this research likely to directly involve participation from an identified group that would benefit from an equitable process or outcome?

☐Yes ☐No ☐Unsure

4d Is the intended final product or information expected to support ODOT's equity efforts (Including but not limited to supporting one of the equity related objectives of the ODOT's Strategic Action Plan or Oregon Transportation Plan) ?

☐Yes ☐No ☐Unsure

4e If you answered yes to any of the equity questions above or can provide alternative details related to equity, please provide additional information:

The implementation of Safe System-aligned countermeasures and practices can result in fewer crashes among particularly vulnerable populations, especially if the focus of the Safe System efforts is placed on improving pedestrian and bicyclist safety and on reducing motor vehicle operating speeds. If these efforts are focused in communities experiencing inequitable crash outcomes (e.g., black and indigenous communities in Portland [https://www.portland.gov/transportation/vision-zero/deadly-traffic-crash-demographics]), achieving safety goals can also support achieving equity goals.

Safety
Research outcomes may include interventions and countermeasures to prevent or reduce the frequency of crashes or other causes of transportation-related injury or death; or may include measures to reduce severity of injury (including prevention of death) after a crash or other injurious event. For definitions and details please review the equity vision, goals, and objectives of the ODOT Strategic Action Plan, Oregon Transportation Safety Action Plan and Oregon Transportation Plan.

4m. Will solving the **transportation issue** in question 1 support improving **safety culture** for either transportation workers or the traveling public?

☐Yes ☐No ☐Unsure

4n. Will the solving the **transportation issue** support improving safety through **healthy and livable communities**?

☐Yes ☐No ☐Unsure

4o. Will solving the **transportation issue** support improving safety through using **best available technologies**?

☐Yes ☐No ☐Unsure

4p. Will solving the **transportation issue** support improving safety through **communication and collaboration**?

☐Yes ☐No ☐Unsure

4q. Will the solving the **transportation issue** support improving safety through **investing strategically**?

☐Yes ☐No ☐Unsure

4r. If you answered yes to any of the safety questions above or can provide alternative details related to safety, please provide additional information:

The Safe System Approach is intended to provide a safe and equitable transportation system for the traveling public and for all modes of transportation. This is accomplished through five key elements: (1) Safe People, (2) Safe Vehicles, (3) Safe Speeds, (4) Safe Roads, and (5) Post-Crash Care. By addressing each of these elements, the application of the Safe System Approach improves safety providing healthy and livable communities. Roadway design that reinforces safe driving and safe speeds and is tailored around lowering Level of Traffic Stress for vulnerable road users, results in roadways that encourage active transportation use. This multimodal-focused approach leads to communities that are more emboldened to walk or bike, in addition to improving vehicle safety, which leads to healthy and livable communities from multiple facets.

The paradigm shift to the Safe System Approach offers opportunities to explore and apply the best available transportation technologies to achieve its goal, where this research will focus on these technologies. The application and implementation of the Safe System Approach creates opportunities for public-private communication and collaboration, as well as public awareness initiatives to highlight the strengths of the Safe System Approach and how implementation goes hand-in-hand with Vision Zero goals.

Tools for effective implementation of the Safe System Approach will allow ODOT to target safety investments strategically and prioritize projects through a Safe System Approach lens.

5. Other comments:

Safety is one of the highest priorities at ODOT. The Safe System approach refocuses transportation system design and operation on anticipating human mistakes and lessening impact forces to reduce crash severity and save lives (FHWA n.d.). This proposed study focuses on developing methods, guides, worksheets, and tools to help assess the system and develop sound comprehensive project strategies that can be implemented at ODOT to apply the Safe System approach in decision making.

Our proposed team consists of researchers from Portland State University and University of North Carolina at Chapel Hill who bring a wealth of experience in the Safe System Approach. They are currently helping Washington State Department of Transportation apply the Safe System Approach in Decision Making. PSU has worked on several safety projects for ODOT including updating the Highway Safety Investigation Manual for Oregon DOT. UNC in particular brings a pedigree of pushing the Safe System Approach toward implementation in the United States. HSRC team members were involved in the Collaborative Sciences Center for Road Safety (CSCRS), a U.S. DOT University Transportation Center oriented toward shifting the practice of road safety toward a new, Safe System-based paradigm. CSCRS published foundational research in the Safe System Approach, and HSRC team members joined both the Safe System Consortium and the Road to Zero Coalition Steering Group to accelerate adoption of the approach. Members of the project team are also currently

working on National Cooperative Highway Research Program Project 17-101: Applying the Safe System Approach to Transportation Planning, Design, and Operations in the United States.

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