Oregon Department of Transportation

Research Stage 1 Problem Statement

Number 26-34 – "Assessment of Roadway Treatments to Minimize Crash Risk with ODOT Infrastructure and Costs"

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

The current ODOT highway system requires significant new investments to maintain or reach appropriate conditions for roadway users, in particular for people walking and biking. An estimated $4 billion is needed to bring the walking and biking facilities up to standard, at the same time ODOT Maintenance budget is facing ongoing funding gaps due to a decrease in traditional revenue sources to pay to maintain transportation infrastructure. New transportation infrastructure such as pedestrian rectangular rapid-flashing beacons (RRFBs) are required to meet Strategic Action Plan targets of pedestrian crossing spacing but also come with an increased maintenance costs. Once installed RRFBs are frequently damaged by errant vehicles, adding $10,000 to traditional maintenance costs and projects are now scoping overhead RRFBs instead of roadside sign mounted RRFBs to reduce maintenance cost at the expense of a capital investment nearly 10x as expensive, roughly $2m compared to $250k).

This additional capital cost not only delays our ability to meet our SAP goals for pedestrian facilities, expensive future liabilities are also created as these structures need to be maintained. Many of ODOT assets are placed on breakaway platforms (and placed as far from the roadway as possible) to reduce the fixed hazard crash risk to errant vehicles, but ODOT Maintenance is left with the cost burden from replacing damaged equipment (as we are rarely able to make Claim Against Others to recoup the cost as errant vehicles drive away) – this project would conduct a cost/benefit analysis looking at the construction and long-term maintenance costs around protecting transportation infrastructure compared to the fixed object crash risk of adding new fixed hazards into the roadway clear zone based on roadway speed limits and volumes. This analysis could also be applied to the vehicle crash safety concerns for protected bike lanes or pedestrian facilities, and to protecting transit stops and their users from errant vehicles. There should also be some consideration on how much added fixed object risk is really being added as many of these treatments would likely be in constrained urban locations where there are likely already many existing fixed objects.

There are many materials and techniques that can be used to protect ODOT assets from errant vehicles which each have their own construction/maintenance costs, crash risks, and benefits beyond just protecting ODOT infrastructure. These include:

- Fixed objects such as bollards, guardrails, and various barrier types.

- Environmental materials or techniques such as buffering transportation assets and facilities with swales or stormwater infrastructure, landscape improvements decreasing speeds and crash severities (as shown in *Landscape improvement impacts on roadside safety in Texas* (Mok, Ladphair, and Naderi, 2005)), or street trees (*Urban clear zones, street trees, and road safety* (Marshall, Coppola, and Golombek, 2018)).

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

1 to 2 paragraphs – The point of ODOT research is to improve how public agencies provide transportation in Oregon. Please explain what you need studied to help resolve the transportation problem in question 1. You may list specific work policies, standards, procedures or other documents that may need to be updated if this research is successful.

This final products from this research would be:

1) A cost benefit analysis and criteria such as initial costs, maintenance costs, and crash risk hazard compared to speed and volume around what transportation infrastructure warrants designing it to be protected from errant vehicles.
2) A toolkit of practices and materials that can be used to prevent vehicles from damaging transportation infrastructure while ensuring roadway safety.
3) An update to the Highway Design Manual with language changes about clear zones and their need to balance safety and maintenance goals.

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.

Name	Title	Email	Phone

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:

There are greenhouse gas emissions reductions to be gained by building using the smallest possible facility available (roadside compared to overhead RRFB) and reducing the replacement cycle (and associated maintenance required) of the equipment, so these should also be included in the cost benefit analysis.

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:

This project is will make the transportation system safer for people walking and biking (and predominately serve historically underserved populations) by ensuring walking and biking infrastructure stays functional for longer and reduce the cost for implementing those features.

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:

This proposal seeks to primarily improve safety by investing strategically with limited dollars through weighing the benefits and costs of protecting transportation infrastructure, rather than just pushing the costs of damaged equipment onto ODOT maintenance. Technologies such as RRFBs are the best available technology at the moment and expensive but essential for meeting our SAP walking and biking goals and creating healthy and livable communities, and this research will allow us to build and maintain them for less money.

5. Other comments:

6. Corresponding Submitter's Contact Information:

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