Oregon Department of Transportation

Research Stage 1 Problem Statement

Number 26-31 – "Alerting workers in overhead working conditions of potential over-height trucks and/or work zone intrusions."

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

ODOT maintenance activities such as those associated with bridge painting can require work to be performed above an active roadway below. The roadway below may be temporarily closed to prevent motorists from being exposed to potential dropped objects. The roadway below may also be closed if over-height trucks could impact the safety of the workers above. While the maintenance work is taking place, workers may not be present on the roadway below or may not be able to see the closed lanes from above. In such cases, the workers cannot monitor whether a vehicle intrudes, either deliberately or not, into the closed area below and places the workers and motorists at risk of injury or fatality. Technology such as work zone intrusion alert devices may provide a means to alert workers and motorists of the intrusions in these working conditions, including when there is a danger to over-height trucks. Research is needed to investigate whether technology can be used in such conditions and to develop recommendations for its effective use.

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

Work zone intrusion alert technologies are commercially available that have been shown to effectively alert workers of vehicle intrusions into work areas. Some of the technologies also alert drivers when they intrude into a closed area. The alert technologies are typically placed on the roadway, on a traffic control device, or on a work vehicle. Past (SPR 790) and present (SPR 876) ODOT research studies have investigated intrusion alert technologies and provide guidance on their application and effectiveness in roadway work zones. However, research to date has not explored the use and effectiveness of the alert technologies in situations in which work is performed above a closed roadway below, especially to capture the presence of over-height trucks. The aim of the proposed research is to investigate how to effectively implement work zone intrusion alert technologies in such situations to help ensure the safety of workers and motorists. The following are potential research tasks to meet the study goal:

- Identify situations during ODOT maintenance activities in which work is performed above a roadway that require closure of the travel lanes below to over-height trucks and/or all vehicles.
- Document the typical work zone setups when work is performed above a roadway.
- Identify ways in which work zone intrusion alert technologies could be installed and used to monitor the roadway below for the presence of over-height trucks and intruding vehicles.
- Implement an alert technology during a maintenance operation to test its application, effectiveness, ease of use, and feasibility of implementation.
- Develop guidance for ODOT maintenance staff regarding the implementation of intrusion alert technologies during maintenance operations occurring above a roadway to alert workers of the presence of over-height trucks and/or other vehicles on the roadway below. This implementation

guide is needed to support ODOT Maintenance in the application of the technologies in such situations.

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
Rebecca Burrow	Assistant Maintenance Manager	Rebecca.Burrow@odot.state.or.us	(503) 951-9333
Michael Gehring	Region 1 Bridge Maintenance Supervisor	Michael.E.GEHRING@odot.state.or.us	(503) 731-8326
Cory Hamilton	District 2 Maintenance Manager	Cory.D.HAMILTON@odot.state.or.us	
Ted Miller	Region 1 Maintenance and Operations Manager	Theodore.C.MILLER@odot.state.or.us	(503) 731-8559

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:

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:

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 problem to be addressed by this research is directly related to the safety of ODOT maintenance workers and motorists. Vehicles intruding into closed work areas put workers at risk of being hit by the intruding vehicles and expose the intruding motorists to hazardous conditions in the work zones. Utilizing intrusion alert technologies will alert workers and motorists of an intrusion and the potential for a crash. It is expected that the use of alert technologies will prevent work zone crashes and improve roadway safety for roadway workers and the traveling public.

5. Other comments:

Gambatese, J.A., Lee, H.W., and Nnaji, C.A. (2017). "Work Zone Intrusion Alert Technologies: Assessment and Practical Guidance," Final Report, SPR 790. Oregon Department of Transportation (ODOT) and U.S. Department of Transportation, Federal Highway Administration (FHWA), June 2017, http://www.oregon.gov/ODOT/Programs/ResearchDocuments/SPR790_IntrusionAlertTech.pdf.

"Implementation Requirements for Work Zone Intrusion Technologies to Reduce Fatalities." Oregon Department of Transportation (ODOT), Project Number SPR 876, Aug. 2023 – Dec. 2025. (In-progress)

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