

Number: 25-20

Proposed Title: High Energy Control Assessments for Work Zones

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

Leading indicators are commonly used to assess the level of safety in construction and maintenance work operations and can be used as proxies to predict the risk and potential for a crash or work injury. However, when designing, planning, and implementing a traffic control operation in a work zone, limitations associated with a lack of or limited work zone crash data, inability to fully recognize all potential hazards for a specific project given the complexity and dynamic nature of work zones, and misunderstanding of the effectiveness and value of different types of traffic control measures, can inhibit effective assessments of the level of risk present and the corresponding level of safety provided in work zones.

High energy control assessment (HECA) is a newly developed process that utilizes evaluations of the type and magnitude of energy present (e.g., the energy in a passing vehicle, in a moving piece of equipment, and in a large load hoisted by a crane), along with the presence of direct and indirect (human-dependent) controls, or lack thereof, to enable effectively controlling the energy and preventing injuries/fatalities. HECA is simple to implement and generates a risk score based on the anticipated field conditions that is easy to understand and act on. Prior research outside the transportation sector has shown that HECA can significantly improve risk assessments and safety planning, and is an effective alternative means for managing safety risk and increasing awareness and identification of potential workplace hazards (Erkal and Hallowell, 2023). Nevertheless, the application of HECA to roadway construction and maintenance work zones has yet to be tested and developed for use by state transportation agencies. HECA is a promising means to improve hazard awareness and traffic control design in work zones that warrants exploring further and developing guidance/training for implementation in the transportation sector.

2. Document how this **transportation issue** is important to Oregon and will meet the [Oregon Research Advisory Committee Priorities](#)

The proposed research addresses the difficulty in identifying hazards and ensuring the presence of adequate controls within construction and maintenance work zones and, as a result, maintaining a high level of confidence that work operations and traffic control designs will result in the desired level of safety for the travelling public and roadway workers. This issue directly relates to the safety of the travelling public, ODOT employees, and contractor personnel in roadway work zones. Transportation network safety is a topic that is a priority for both the ODOT Research Advisory Committee (RAC) and the ODOT Research Construction and Maintenance (CM) Expert Task Group (ETG). The proposed research is expected to produce guidance/training for those who work in roadway work zones. The training is intended for workforce development, which is one of the RAC's research focus areas. The proposed project is applied research that will lead to practical outputs. These outputs have a high likelihood of implementation in practice and potential impact on ODOT and contractor work practices. Successful implementation of the research results is not only expected to help prevent worker and motorist injuries and fatalities in work zones, but also to improve mobility on Oregon's roadway network as a result of fewer crashes in work zones. Mobility is also one of the topics contained within the Oregon Transportation Plan (OTP) and a priority for research problem statements.

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

Implementation of the research results in practice will require tailoring the current HECA process to roadway construction and maintenance work zones, if needed, along with developing implementation guidance. Data collection and analysis should aim to identify common high energy situations in roadway construction and maintenance, along with the types of controls available and commonly used. The research then needs to develop information on how to implement the HECA process that can be incorporated into a guidance document. Research activities needed would likely include:

- Review archival literature on HECA and the types of energy sources commonly found in roadway construction and maintenance work zones
- Analyze crash and injury incidents to quantitatively determine the magnitudes of energy sources commonly found in roadway construction and maintenance work zones
- Identify direct and indirect controls that could be implemented to mitigate the energy present
- Develop, demonstrate, and evaluate the HECA process for roadway construction and maintenance activities
- Prepare final guidance documents for implementation in practice

The information needs to be provided to those ODOT construction and maintenance personnel who plan and conduct work operations on active roadways. A guidance document that provides the information mentioned above and training materials to educate field staff on implementation of the developed HECA process would be needed.

4. (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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5. Other comments:

Erkal, E.D.O. and Hallowell, M.R. (2023). “Moving Beyond TRIR: Measuring & Monitoring Safety Performance with High-Energy Control Assessments.” *Professional Safety*, ASSP, 68(5), 26-35, May 2023.

High energy control Assessment (HECA): <https://www.urbint.com/blog/high-energy-control-assessments-heca-what-they-are-and-how-they-save-lives>

6. Corresponding Submitter’s Contact Information:

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