



Research Stage 1 Problem Statement

Number 26-66 – “Improvements to Aggregate Crushing and Production for Asphalt Concrete and Portland Cement Concrete to Reduce Carbon Footprint”

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

A well-graded aggregate structure is the basis for optimizing Asphalt and Portland Cement Concrete mixtures. The aggregate particle shape can significantly affect how much these mixtures are optimized. Currently, ODOT specification requirements allow aggregate production or crushing procedures that can result in a high percentage of flat and elongated particles which reduces the potential optimization of all Asphalt and Portland Cement Concrete mixtures used in Oregon.

Aggregate production using vertical shaft impact (VSI) crushers or high-speed cone size reduction equipment have shown to produce a more cubical and consistent aggregate particle shape which helps to reduce the spacing between aggregate particles, helps to lock the aggregate matrix together, and contributes to the final mixture optimization. The use of high-speed cone and or VSI’s can create a more predictable aggregate particle shape regardless of type of base aggregate material being used, from river gravels to quarried sources. By optimizing the Asphalt and Portland Cement Concrete mixtures used in Oregon, we can increase the cost-effectiveness and reduce the environmental impacts of the decreasingly available aggregate sources in the state while producing better performing pavements.

In short, the transportation issue being addressed is: Elongated aggregate particle shape provided by current commercial suppliers or crushed by current sub-contractors do not permit an optimization of Asphalt Cement and Concrete Cement mixtures.

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

To implement the findings of this research, a draft of changes to existing specification(s) and construction manuals would need to be developed and ultimately adopted.

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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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 gases (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:

Consistent aggregate shapes at rock crushing facilities have the potential to lead to more predictable performance of concrete structures which can reduce future repair/retrofit costs which often require the use of additional cement.

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:

This research project proposes to investigate the implementation of modern rock crushing technologies at the state. As the regulating agency for all state-owned infrastructure, the agency is well positioned to lead the de-risk the implementation of modern technologies by investing in research and development activities that lead to better, more durable pavements.

5. Other comments:

6. Corresponding Submitter's Contact Information:

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