



Research Stage 1 Problem Statement

Number 26-49 – “Internal Curing - Improving the Performance of Concrete Reducing GWP Over Life”

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

Internal curing research was performed by Oregon State researchers as early as 2005 and has been promoted with numerous successful implementations. FHWA has identified this as part of the Everyday Counts initiative (EPIC2). While the material of choice to this point has been expanded to lightweight aggregate, Oregon boasts aggregate in the central portion of the state that could be evaluated and used for these purposes. These materials are ‘naturally occurring deposits’ that would reduce the global warming potential associated with not having to heat and bloat these materials. Further, as local materials, these materials will have substantially lower GWP associated with transportation.

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

This will develop internally cured concrete mixtures using Oregon pumices and measure the transport and mechanical performance. This project has the potential to benefit ODOT as well as other DOTs in the region (IDOT, WDOT, Caltrans). The program will provide mixture proportions for internal curing using Oregon pumice. The program would include demonstration projects to provide technical support and documentation of this project. The benefits of 75 to 100-year service life will be discussed.

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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Austin Johnson	Concrete Quality Coordinator	Austin.L.JOHNSON@odot.oregon.gov	503-510-1384
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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

[The project will assess GHG/GWP of internally cured mixtures to reduce GHG/GWP.](#)

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

[The project will assess GHG/GWP of internally cured mixtures to reduce GHG/GWP.](#)

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

[The project will assess GHG/GWP of internally cured mixtures to reduce GHG/GWP.](#)

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

[The project will assess GHG/GWP of internally cured mixtures to reduce GHG/GWP.](#)

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:

[See responses above](#)

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:

[While the project is not focused on equity the process can be used by all and provides a level platform for evaluating material solutions.](#)

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

[Establishing practices for quantifying and specifying internal curing which is longer lasting than standard concrete. This also reduces traffic at construction sites which have been known to result in a substantial increase in accidents and fatalities.](#)

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:

[These results are provided in the sections above.](#)

5. Other comments:

[Title: Internal Curing – Improving the Performance of Concrete Reducing GWP over Life](#)

[Category: Process for Substantially Lower Embodied Carbon](#)

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in the region (IDOT, WDOT, Caltrans). Again, the program would include demonstration projects to provide technical support and documentation of this project. The benefits of 75 to 100-year service life will be discussed.

6. Corresponding Submitter's Contact Information:

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