

**Number:** 25-57

**Proposed Title:** Advanced 3D Printing for Sustainable Infrastructure Development in ODOT: Fish Baffles and Beyond

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

The Oregon Department of Transportation currently relies on traditional methods for infrastructure component fabrication, including fish baffles in culverts. These methods are time-consuming, inflexible, and often environmentally taxing. By integrating 3D printing technology, ODOT can significantly enhance the design, production efficiency, and customization of these components. This technology offers tremendous benefits across various departments, enabling the geotechnical group to create terrain-specific structures, the climate group to develop infrastructure resilient against environmental changes, and the construction and maintenance group to rapidly produce parts on-site, thereby reducing repair times and costs.

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

The integration of 3D printing technology in ODOT operations aligns perfectly with Oregon's strategic priorities, particularly in enhancing ecological compatibility, sustainability, and operational efficiency. For the geotechnical group, 3D printing offers an innovative approach to designing foundations and soil retention structures tailored to Oregon's diverse landscapes. The climate group can benefit from creating adaptable infrastructure components that can withstand diverse environmental conditions, thus contributing to the resilience of Oregon's transportation network. For the construction and maintenance group, this technology allows for efficient, on-demand production of components, leading to streamlined processes and reduced environmental impact. In fish baffle design, the precision and adaptability of 3D printing can significantly enhance fish passage, aligning with ecological conservation goals.

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

This study aims to produce a comprehensive report evaluating the feasibility of 3D printing in ODOT's operations. The report will include prototype development for 3D-printed fish baffles, demonstrating their efficiency in improving fish passage and ecological compatibility. Additionally, it will explore the application of 3D printing in other departments, assessing the benefits in terms of material use, cost efficiency, and environmental impact. The study will also propose guidelines for implementing 3D printing technologies across various ODOT departments, enhancing overall infrastructure resilience and sustainability.

The proposed research tasks are:

1. **Feasibility Study and Prototype Development:** Analyzing the technical and economic feasibility of 3D printing for infrastructure components, with a focus on fish baffles.
2. **Material Innovation for Geotechnical Applications:** Investigating the use of local soil and sustainable binders for 3D printing, tailored to geotechnical needs.
3. **Climate-Resilient Infrastructure Design:** Designing infrastructure components using 3D printing that are adaptable to Oregon's changing climate conditions.
4. **Efficient Construction and Maintenance Processes:** Exploring the use of 3D printing for rapid, on-site production of infrastructure parts, reducing repair times and costs.

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.

Name	Title	Email	Phone
Kira Glover-Cutter	<i>Research Coordinator and Analyst</i>	kira.m.glover-cutter@odot.oregon.gov	503-843-1176
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Sophie Brown	Senior Retaining Wall Engineer	Sophie.BROWN@odot.oregon.gov	503-509-4538

5. Other comments:

This research initiative is poised to set a new standard in sustainable and innovative infrastructure solutions. It emphasizes ecological compatibility, efficient resource utilization, and cross-departmental benefits, thereby enhancing ODOT's operational efficiency and environmental stewardship.

Specific benefits of 3D Printing Across Various ODOT Departments:

- Geotechnical Group: Enhancing the design and production of terrain-specific structures.
- Climate Group: Developing adaptable infrastructure components for a changing climate.
- Construction and Maintenance Group: Streamlining maintenance processes through rapid, on-site printing.
- Culverts Group: Constructing custom-shaped and sized culverts with incorporated features such as baffles.

6. Corresponding Submitter's Contact Information:

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