

**Number:** 25-56

**Proposed Title: Guide for examining concrete bridge members with no available plans using non-destructive testing (NDT) techniques**

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

Load posting of a bridge can have devastating social and economic consequences for the affected communities. Often, a posting is not the result of inadequate capacity or a deficiency but due to a lack of available as-built plans and affiliated information such as design specifications and materials testing results. As a result, highly conservative default values for material properties such as concrete strength must be used per the MBE. Non-destructive testing (NDT) techniques can help examine and ascertain pertinent geometric and material properties when this information is not available. While some NDT toolboxes have been developed for the use by DOTs, they typically focus on condition assessment. Thus, a need exists to evaluate available NDT techniques, and their combined use, specifically for the purpose of supporting bridge load rating.

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

Due to budget constraints, it is impossible to simply replace all the posted bridges in Oregon. It is thus imperative that ODOT finds informed ways to examine them and produce the most accurate load ratings possible based on in-situ measurements. This research will specifically address the priority “stewardship of public resources” by developing a methodology based on “innovative technologies and systems”. The underlying objective of the research is to keep Oregon’s bridges in a state of good repair, which ensures optimal preservation as well as accurate load ratings. This is only possible when accurate and reliable information is available about them. An informed approach based on a combination of NDT techniques will help load rating engineers to determine material properties, member geometry, rebar locations, and structural condition.

A posted bridge can render a route non-functional more quickly than, for example, poor pavement condition. In the case where an emergency vehicle (EV) or a special hauling vehicle (SHV) is denied rapid access to a community because of a posting, dramatic consequences may result. By avoiding unnecessary postings, this research will thus also directly support “economic and community vitality” while maintaining public safety.

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

The final product is a detailed practical guide that will inform bridge owners and guide consultants to employ NDT techniques to perform accurate load ratings based on in-situ measurements. The guide will contain information about the applications and limitations of pertinent NDT techniques, step-by-step procedures for them, as well as expected uncertainties and errors associated with them. To produce this information, a range of available NDT techniques will be reviewed, tested, and evaluated on laboratory specimens as well as some in-service concrete bridge members. A week-long workshop and educational materials will be developed and made available to interested ODOT employees. The workshop will consist of theory and hands-on application in a real-world setting. The plan is to continue to offer the workshop in the following years, which ensures that the research has a lasting impact.

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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Ray Bottenberg	State Bridge Engineer	Raymond.D.BOTTENBERG@odot.oregon.gov	(503) 551-7934

5. Other comments:

Other State DOTs as well as local agencies such as the Portland Bureau of Transportation and Multnomah County Bridge Section might also be interested in and benefit from the final product.

6. Corresponding Submitter's Contact Information:

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