Oregon Department of Transportation

Stage 1 Research Problem Statement

Number*: 25-47*

Proposed Title: Modifications to ODOT Quality Assurance Program to Improve Its Efficiency and Productivity

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

According to the Title 23 Code of Federal Regulations, Chapter I, Part 637, Subpart B (23 CFR 637B), ODOT follows different processes to ensure that certified laboratories and technicians perform all material sampling and testing for acceptance decisions. This Quality Assurance (QA) program clearly defines the responsibilities of ODOT and the contractors (ODOT QA, 2019). The program consists of three major sub-programs: i) Quality Control (conducted by the contractor); ii) Verification (conducted by an independent group-Region QA); and iii) Independent Assurance (conducted by a QA laboratory designated by ODOT). The Construction Section at ODOT is responsible for certifying QC and QA laboratories and technicians. Third-party resolution is sought when there are significant differences between ODOT's QA test results and the contractor's QC results. This third-party resolution can be requested by either the Project Manager or the Contractor, depending on the conflict. The Construction Section's Central Materials Laboratory acts as the Dispute Resolution Laboratory in those conflicts to resolve the disagreement. The program details are available in ODOT QA (2019), provided as a reference in Section 5 of this problem statement.

In the current process, the QA testing (both Verification and Independent Assurance) is performed by a QA laboratory designated by ODOT by following 23 CFR 637B. Also under the current QA process of ODOT, the proficiency of technicians in material testing and their test equipment is evaluated and validated in the Independent Assurance sub-program for every case. Since the proficiency of the technician and the testing equipment is not expected to change significantly during the year, having a check once a year is expected to provide the same outcome as the current process while significantly less sampling, laboratory processing of materials, and testing would be needed. However, a comprehensive research study needs to be conducted to identify the impact of this potential revision on the current QA program and its objectives. Many other state DOTs conduct independent assurance and verification separately, while ODOT's current practice combines the two. Having an independent outside laboratory for conducting the independent assurance component and the potential impact of this change on the QA program should also be investigated. This kind of change is expected to reduce ODOT staff time for most of the independent assurance components and allow them to spend more time on the verification testing that is more critical for the program.

Sampling of asphalt mixtures also plays an important role in QC/QA testing. According to research studies in the literature (Elseifi, 2007; Sias et al., 2020), sampling location can affect the test results and create bias in the evaluated quality. The difference in laboratory-measured performance parameters for asphalt mixtures sampled at different points in time after asphalt mixture production should be determined. Those test results should be evaluated to determine the most suitable location for asphalt mixture sampling to achieve results that are more representative of the long-term performance of the produced asphalt mixture. Potential locations for asphalt sampling are: i) the roadway before compaction by placing a mat or plate on the road before placing the hot asphalt mixture, then removing it with the sample after the paver screed passes over it; ii) the truck using a shovel; iii) the truck using a remote (random) mechanical sampling device; iv) from the windrow prior to laydown; and v) by shovel adjacent to the augers in front of the screed. Several studies in the literature have conflicting conclusions regarding the reliability of each method for unbiased asphalt mixture sampling. The reason for the difference in conclusions can be attributed to the differences in aggregate types (shape, texture, angularity, and porosity). Thus, an independent study in Oregon with Oregon aggregates and asphalt mixtures should be conducted to determine the differences between different sampling locations and methods to achieve the best results that represent the actual mixture quality.

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

The primary benefit of reducing the number of independent verifications would be the cost and QA staff time savings while maintaining the success of the current QA process. The staff time and cost savings that can be created by reduced independent assurance can be used to conduct more verification testing activities. Finding the most appropriate asphalt mixture sampling method and location is also critical for ODOT to achieve more realistic quality outputs from current tests used for QA.

The expected improvement in the current QA program through the revisions of the current process has the potential to direct ODOT's staff time and resources to other important areas in the QA program. It is also expected to improve the sampling processes for asphalt mixtures to achieve more realistic QA outputs. For this reason, this proposed research study is expected to address Oregon Research Advisory Committee's *"Process, material, or equipment improvements"* priority by revising a significant component of ODOT's QA program to improve its efficiency and productivity. Revisions to the current process are also expected to address RAC's *"Cost reductions or savings to construction, operations, or asset maintenance"* priority by directing valuable QA office staff time to more critical areas.

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

The past data from the QA program will be collected and analyzed. Based on the results of the statistical analysis, the potential effects of reducing the Independent Assurance sampling and testing on the program outcomes will be simulated. The process to reduce Independent Assurance testing to once a year to save staff time and reduce costs without affecting the efficiency of the entire program will be determined and reported. Based on the findings from the "asphalt mixture sampling location and method effects on the test outputs" component of the proposed research study, the most realistic sampling location and method will be reported to be adapted by the ODOT QA program. Based on the findings of this proposed research study, revisions to the current Quality Assurance Program processes and the related guideline documents will be proposed.

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:

REFERENCES

1) ODOT Quality Assurance Program. (2019) https://www.oregon.gov/odot/Construction/Doc_ManualofFieldTestProcedures/2020/06_QA_Program.pdf

2) Elseifi, M. (2007). Evaluation of Hot-Mix Asphalt Sampling Techniques. Research Report FHWA-ICT-07-010, Illinois Center for Transportation.

3) Sias et al. (2020). Practices for Fabricating Asphalt Specimens for Performance Testing in Laboratories. Washington, DC: Transportation Research Board, NCHRP Synthesis 552.

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