

Optimizing Materials QA to Improve Construction, Save Costs



Image courtesy of U.S. Air Force

Quality assurance is an important but expensive task, and transportation agencies can save costs by prioritizing investments based on risk.

REAL-WORLD NEED

Quality assurance (QA) can be a double-edged sword when verifying the materials used in transportation construction projects. Implementing QA practices is important because materials that don't meet specifications may increase the risk of failures in the facilities where they are used. These failures may increase maintenance costs, hamper mobility, or create safety hazards. QA is an expensive task, however, and many state departments of transportation (DOTs) are facing shrinking budgets and reductions in the size of their inspection staffs. States needed a tool to reduce QA costs while maintaining quality in construction.

RESEARCH SOLUTION

NCHRP Project 10-92 developed a flexible decision-making process that agencies can use to select and prioritize QA practices for materials. The process has three levels of analysis based on qualitative risk ratings, testing and sampling, and costs of QA activities and material noncompliance. Agencies can select an analysis level based on their needs and available data. The process is aimed at helping agencies invest money and effort where the risk and consequences of material failure are greatest and ultimately achieve the necessary quality of construction at lower costs.

NEXT STEPS Put It into Practice

ANALYZE

Use existing cost data with the model developed in NCHRP Project 10-92 to select QA practices more objectively.

CONSULT

When quantitative data isn't available, use the Delphi method to reach a consensus of experts on where to perform QA.

ASSESS

Adapt the NCHRP Project 10-92 framework to assess QA practices on a project or program level.

CONTACT

Follow up with states that have implemented structured approaches to materials QA, including California, Washington, South Dakota, Texas, and Indiana.

PARTNER

Apply for NCHRP implementation funding. See trb.org/nchrp.

About the Research

RESEARCH STRATEGY

To identify best practices in QA, researchers performed a literature review, conducted an online survey of nearly 200 experts drawn from the AASHTO Subcommittees on Maintenance and Construction and other practitioners, and interviewed representatives of eight state DOTs that have a structured approach to materials QA. Using this information, investigators developed a decision-making process for evaluating and selecting QA practices for each construction material. The process will help agencies focus QA investments on materials that are most likely to fail to meet specifications and where the consequences of noncompliance are most severe.

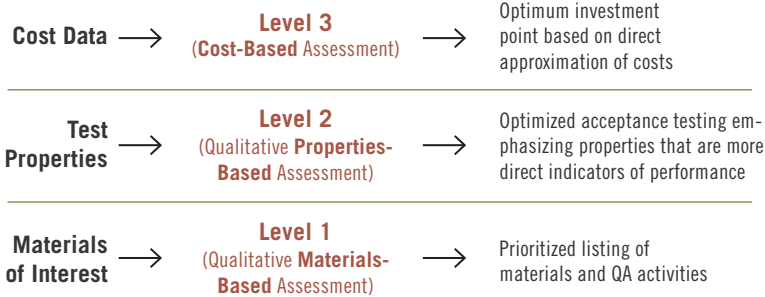
WHAT WE LEARNED

The decision-making process has three levels of increasing analytic rigor: qualitative analysis, evaluation of specific material properties and testing, and cost-benefit analysis. Agencies can select one or more levels of analysis for each material based on the data available and the kind of analysis needed. The first level allows agencies to select QA methods for each material based on the likelihood and consequences of noncompliance. The second level evaluates testing activities based on specific material properties and tests that directly indicate performance. The final level analyzes costs and benefits using agency data to select the optimum level of QA investment.

WHY IT MATTERS

Transportation agencies can use the process developed in NCHRP Project 10-92 to optimize their QA practices, thus investing time and money where these resources are most needed and most effective. The process also provides an opportunity to review long-standing QA specifications that may no longer be necessary. For example, materials such as plastic pipe and guardrails are now mass-produced to tight quality specifications. Agencies can use the process to determine if they can save money by reducing inspection or testing of these materials without affecting quality and performance.

The 3 Levels of the QA Practice Analysis Process



Adapted from draft final report (Figure 4.1)

Transportation agencies can choose from three levels of rigor, depending on their needs and available data.

RESOURCES



Image courtesy of U.S. Army

NCHRP PROJECT 10-92

FINAL PRODUCT

NCHRP Research Report 838: Guidelines for Optimizing the Risk and Cost of Materials QA Programs will be published in 2017.

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ADDITIONAL RESOURCES

- TRB webinar (scheduled for 2017) trb.org/ElectronicSessions/RecordedSessions.aspx
- State DOTs' structured approaches to materials QA include:
 - Caltrans *Construction Quality Assurance Program Manual*: dot.ca.gov/hq/construction/docs/cqap_manual.pdf
 - Washington State DOT *Construction Manual*, Chapter 9: wsdot.wa.gov/publications/manuals/fulltext/M41-01/Chapter9.pdf
 - Texas DOT *Design-Build Quality Assurance Program Implementation Guide*: ftp.txdot.gov/pub/txdot-info/cst/db_qap_guide.pdf

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