

NETC 15-4 QR: Optimizing Quality Assurance (QA) Processes for Asphalt Pavement Construction in the Northeast

Jo E. Sias, Ph.D., P.E.

May 7, 2020

*Department of Civil and Environmental Engineering
University of New Hampshire*



Acknowledgements

Project Team:

Eshan Dave, Alan Perkins, Chibuike Ogbo, Kacie Ferraro

Project Technical Committee:

- Denis Boisvert, New Hampshire Department of Transportation
- Mark Brum, Massachusetts Department of Transportation
- Michael Byrne, Rhode Island Department of Transportation
- Kevin Cummings, Maine Department of Transportation
- Robert Lauzon, Connecticut Department of Transportation
- Aaron Schwartz, Vermont Agency of Transportation

Presentation Outline

1. Project Overview

- Motivation
- Methodology and Timeline

2. Summary of Findings

3. Recommendations

4. Next Steps

PROJECT OVERVIEW



Project Motivation

- The use of quality assurance (QA) systems in highway infrastructure is critical to ensure durable, safe, and economical transportation operations
- Many asphalt producers and paving contractors in New England serve multiple states
- Cost savings can be realized if QA processes are acceptable to all states
 - Sharing of QA resources
 - Simplified training program
 - Streamlining of producer and contractor operations
- Successful collaboration among New England agencies exists in the form of the NETTCP

Methodology and Timeline

July-Sept 2018:

- Review of current state of practice of QA for asphalt pavement construction
 - *Specification review and survey of agencies*
- Identification of challenges and opportunities

Oct 2018:

- Survey of contractors
- Initial roadmap of actions

Nov 2018:

- Workshop with agencies and contractors

Dec 2018:

- Development of recommendations
- Final report and presentation

SUMMARY OF FINDINGS



Sampling (Frequency and Location)

■ Binder

- Location: *Most agencies sample in-line*
- Frequency: *ranges from daily to once per project*

■ Loose Mixture

- Location: *For QC: truck at plant*

Agencies: truck at plant, paver hopper, or behind the paver

- Frequency: *Once per 500-750 tons*

■ Field Cores

- Location: *Mat and some states also sample at joint*
- Frequency: *unique to each state*
- Most states take 6" cores

Testing Requirements

- QC Testing
 - All but one state specifies minimum number of test requirements
 - Most tests are common, a few unique to some states

- IA Testing
 - All states employ IA program
 - Test requirements vary

- Agency Testing
 - Contractor results are validated in four out of the six states
 - Most of the test results validated are common to at least two states
 - Only a few tests are not common among the states

Chain of Custody

- Loose Mixture
 - Four states have DOT personnel take immediate possession
 - Two states have contractor deliver
- Field Cores
 - All but one state has contractor deliver

Dispute Resolution

- Three states test split samples
- Two states take new samples
- One state does not have dispute resolution

Paperwork/Report

- States employ different methods of sharing feedback and results with contractors
- Varying levels of efficiency
- Some states developing or using database to generate automatic reports

Pay Factor

- States use different aspects of QA spec to calculate
- Some states calculate separately for various parameters
- Some states use composite calculation

Certification Requirements

- Requirements vary between agencies (one agency does not require any form of certification)
- All are some form of NETTCP training

RECOMMENDATIONS



Sampling (Frequency and Location)

■ Binder

- Location: *in-line* for evaluation of what goes into mixture
- Frequency: For QC, should be tested daily
For Acceptance, randomly testing one out of seven

■ Loose Mixture

- Location: For QC, truck at plant for real time adjustments
For Acceptance, behind paver for more representative sample of final product and as a check
- Frequency: For QC, 1 per 500 tons
For Acceptance, tiered approach based on importance

■ Field Cores

- Location: Mat Cores from mainline
Joint Cores should be made optional (difference in joint construction technique)
- Frequency: Tiered approach based on importance of project

Testing Requirements

- All states should adopt QC testing requirements
- Optimum Testing requirements applicable to both QC, IA and Acceptance

Binder	Loose Mixtures	Cores	Post construction
PG testing (AASHTO M320)	Binder content	In-place mat density	Ride smoothness
Extended aging evaluation (40PAV)	Aggregate gradation	In-place joint density	Cross slope
MSCR for PMA	Volumetrics (Air Voids, VMA and VFA)	Thickness	

Additionally for QC only: Aggregate Angularity, mix temperature and surface temperature as they affect ease of construction.

- Clause in specification for performance testing when additives are used.

Chain of Custody

- Loose Mixture
 - 2 alternatives due to difference in test location
 - *DOT personnel take immediate possession of sample in all the states that test at the plant.*
 - *Courier services can be employed in the states that test at the state lab.*

- Field Cores
 - For timely delivery process, courier service is recommended to be used for field cores by all states
 - Transport boxes and security measures currently used in ME

Dispute Resolution

- Dispute resolution should be allowed to be fair to contractors
- Sampling splits from the onset is most efficient method.
 - On occasions where dispute arises, the split samples can then be tested.

Paperwork/Report

- Development of a database system/portal for more efficient data sharing.
 - System should be similar or compatible across states
- Report should include all quality level analysis

Pay Factor

- Time wise, calculation of pay factor done separately on each element is the best approach
- Pay factor parameters should include:
 - Gradation
 - Binder Content
 - Volumetrics (air voids, VMA, VFA)
 - In-place mat density
 - In-place joint density (when evaluated)
 - Thickness
 - Ride quality
 - Cross slope

Certification Requirements

- NETTCP certification required for contractor and agency personnel

- Minimum contractor personnel certification should include:
 - HMA Plant Technician
 - HMA Paving Technician
 - Quality Control Plan Administrator

- Minimum agency personnel certification should include:
 - HMA Plant Inspector (agencies with staff at plant)
 - HMA Paving Inspector

Agency Presence in Plant Facility

- Frequent casual inspection of plant facilities by agencies based on availability
- Official annual inspection
- Each state's inspection certification should be generally accepted
 - States serviced by one plant should consider alternating inspection at different times in the year

NEXT STEPS



- Consensus on adoption of recommendations
 - Additional workshops and pilot projects required
- A draft of common QA specs will be required
 - including optional/alternate processes as appropriate
- Further education and training of QA personnel
 - both contractor staff and agency inspectors
- Development of cost sharing model for appropriate allocation of inspection costs
- Implementation of pilot plan
 - to document cost savings and efficiency gains for agencies and contractors
 - to refine the common QA specifications
- Pertinent approvals need to be obtained from FHWA

**Thank you for your
attention!**