

Transportation Synthesis Report

Contractor QA/QC and Workforce Implications for State DOT's

**Prepared for Don Senn, Regional Administrator
WSDOT North Central Region**

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Transportation Synthesis Reports (TSR's) are brief summaries of currently available information on topics of interest to WSDOT staff. Online and print sources may include newspaper and periodical articles, NCHRP and other TRB programs, AASHTO, the research and practices of other state DOT's and related academic and industry research. Internet hyperlinks in the TSR's are active at the time of publication, but host server changes can make them obsolete. Copies of documents where links or pdfs are not provided are available through the WSDOT Library.

Request for Report

This request from Don Senn, WSDOT North Central Regional Administrator, is to identify if there are workforce efficiencies where contractors do QA/QC on construction projects. In construction contracts, the owners have the contractor furnish their own tester and the owners then are able to do the assurance testing. This approach takes less workforce as those staff persons freed from doing testing could be doing other critical delivery item work such as design and/or other major inspection or project management tasks. Oregon uses this type of contractor QC/QA. The success of this approach is uncertain, but it is being done in Oregon, California, Minnesota, and other states and the Federal Highway Administration accepts it.

Summary of the Issue

The issue is to assess the status of contractors doing QC/QA testing in state DOT's, identifying the requirements in various states, and some assessment of impacts to workforce efficiencies. I have attempted to assess how successful/unsuccessful this approach is from state to state. From conversations with FHWA staff in Indiana and Michigan the answer is "it depends" and specifically on the type of contract, and how it is used, and the level of state oversight. I attempted to contact staff in Oregon and Minnesota DOT's using this type of contracting, but did not get a response. FHWA staffs, Lee Gallivan, P.E, Illinois, and Ryan Rizzo, P.E., Michigan, that have experience with the process were contacted. Both cautioned in the use of contractor QA/QC without controls in place. If contacts from other state DOT's and the Washington DC Office of FHWA provide information, it will be forwarded. A summary of state programs, where most of the information is provided by FHWA, is included below.

Information obtained from interviews and published sources did not confirm that workforce efficiencies could necessarily be obtained by having contractors do QA/QC. States must have staff in place to monitor testing, conduct additional testing and do oversight of contractors, requires additional staff oversight and thus may not result in workforce savings.

Contacts

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Key Terms Searched

QA/QC

Quality Control/Quality Awareness

Quality Construction Processes

State transportation workforce

Contractor Quality and Awareness

FHWA rules:

Quality Assurance Stewardship Review - Summary Report for Fiscal Years 2003 Through 2005

A revision of FHWA's sampling and testing regulations titled, "Quality Assurance Procedures for Construction," was published on June 29, 1995, as Title 23, Code of Federal Regulations, Part 637 (23 CFR 637). The regulations require each State agency to have in place an approved Quality Assurance (QA) Program for materials used in Federal-aid highway construction projects. Provided certain checks and balances are in place, the regulations provide flexibility in sampling and testing by allowing the use of contractor test results in the overall Agency acceptance decision. In addition, consultants may be used in performing Dispute Resolution or Independent Assurance (IA) if the laboratories have been AASHTO accredited. The States may also use a system approach to IA instead of establishing frequencies based on individual project quantities.

The regulations also add several additional requirements. They include: (1) the State agency's central laboratory was required to become accredited by the AASHTO Accreditation Program by June 30, 1997, and (2) all testing personnel and laboratories must be qualified using State procedures by June 29, 2000.

This review is part of the Federal Highway Administration overall stewardship activities for State agency QA Programs.

<http://www.fhwa.dot.gov/pavement/materials/stewardreview2006.cfm>

Use of Contractor Test Results in the Acceptance Decision, Recommended Quality Measures, and the Identification of Contractor/Department Risks

Classification Code T 6120.3, August 9, 2004

This Technical Advisory provides guidance and recommendations for the use and validation of contractor's test results for acceptance, the use of quality measures, and the identification of contractor and department risks.

<http://www.fhwa.dot.gov/legregs/directives/techadvs/t61203.htm>

Federal-Aid Policy Guide

July 19, 2006, Transmittal 36

NS 23 CFR 637B

Non-Regulatory Supplement-OPI: HIPT

POLICY (23 CFR 637.205). The Division Administrator shall provide appropriate oversight to ensure that the State's quality assurance program is being implemented as approved. At a minimum the oversight should cover:

Materials sampling and testing issues, construction inspection issues covering the specific attributes which reflect the quality of the finished product, and State capabilities – maintaining an adequate, qualified staff to administer the quality assurance program and qualified laboratories.

<http://www.fhwa.dot.gov/legregs/directives/fapg/0637bsup.htm>

Selected State DOT Rules and Procedures:

State Strategies for Coping with Construction Project Staffing Demands: A State by State FHWA Report

Many states have been experiencing both an increased highway construction program and a reduction in the amount of construction project staff that are available to administer these projects. At times, these contrasting forces have placed severe demands on the resources of many State Department of Transportation (DOT) construction inspection staff.

Summary of Strategies Noted by the States related to QA/QC, manpower forecasting, testing and contractor inspection, and construction management:

Contractor Quality Assurance (AR, CO, CT, FL, IN, KS, KY, MN, MS, NY, UT, VA, WY)

State DOT Manpower Forecasting (AR, NY)

Consultant Design, Inspection and Contract Administration (AK, AZ, CO, CT, DE, FL, GA, KS, MS, NM, NC, NV, NY, VA, WA)

Consultant Material Testing (AZ, NM)

Innovative Contracting (AZ, NM)

Prioritized Inspection, Reduced Testing Frequencies, Phase Inspections, Quality Teams (AK, CT, FL, KY, MD, NV, NY, OH, VA, WA)

Construction Management Software / Automation (KS, KY, NY)

Construction / Maintenance Personnel Rotational Assignments (MD, OH, WY)

District Inspector Transfers (MD, NC, WY)

COLORADO

Colorado Department of Transportation

Quality Control / Quality Assurance by the Producer

CDOT is well into QC by the contractor in pavements and pre-stressed structures.

CDOT is developing a Quality system that will eventually place responsibility for all QC and one level of QA on the producer. CDOT recently begun pilots for this Quality System that place the burden of all QC and one level of QA on a private design firm that is under contract to perform most functional area work on a mid-sized rural project.

CONNECTICUT

Connecticut Department of Transportation

Connecticut Department of Transportation - Division of Research

Telephone: (860) 258-0311

FHWA reviewed in 2004-2005. They use contractor results in the acceptance decision.

Connecticut stated that QA specifications are different from traditional, method specifications as target values are specified and quality is measured mathematically in terms of both the deviation from the target values and the variability of the product. These specifications allow for incentives for superior quality as well as disincentives for work of less than desirable quality. A QA program delineates roles and responsibilities, contains a system of checks and balances, and includes training and education of all participants.

The producer, seller, or manufacturer is in the best position to control his or her product. In a QA system, the Contractor is responsible for Quality Control (QC). The Agency is responsible for accepting the product, using one of three alternative approaches: it can conduct all of the acceptance sampling and testing, Agency test results are combined with validated QC results, or validated Contractor results are used exclusively. Validation of QC results requires verification sampling and testing by the Agency. Regardless of the method, acceptance samples must be randomly obtained.

An Independent Assurance (IA) system provides validity to the QA program. Its function is to ensure that sampling and testing are being conducted properly. The Agency or a designated agent conducts testing to evaluate sampling/testing procedures and equipment (not the material).

Connecticut found that when discrepancies arise between Agency and Contractor test results and these differences are of sufficient magnitude to impact payment, a data-discrepancy resolution process is used. The objective is to resolve all disputes at the lowest possible level, and the data-discrepancy resolution system can include a third party to avoid perceptions of bias.

In Connecticut there have been several achievements in the area of QA implementation. Several trial specifications and special provisions in the area of hot-mix asphalt (HMA) construction have been developed in conjunction with the HMA Task Force for Pavement Improvement and evaluated on various projects.

It is important to include all participants to achieve successful QA implementation. Joint involvement, communication, education/training, continuity, and commitment are all key ingredients to a successful effort implementing QA in Connecticut. With this joint effort and collaboration, Connecticut is working to continue to improve the quality of transportation construction.

NEBRASKA

*Nebraska Department of Roads
Quality Assurance Program for Construction*

The Nebraska Department of Roads Quality Assurance Program allows for the use of validated contractor-performed quality control (QC) test results for the acceptance decision. It also allows for the use of test results obtained by commercial laboratories in the Independent Assurance Program, as well as in acceptance decisions. Contractor and commercial laboratories and their personnel performing Quality Control sampling and testing used in the acceptance decision must be evaluated by the Independent Assurance Program.

<http://www.dor.state.ne.us/mat-n-tests/matsampguide/qa%20program.pdf>

IOWA

*Iowa Department of Transportation
Quality Assurance Program for Construction : Overview and Description*

The Iowa Department of Transportation (DOT) established the following Quality Assurance Program to assure that the material and workmanship incorporated into any highway construction project are in reasonable conformity with the requirements of the approved plans and specifications, including approved changes. The program reflects conformance with the criteria contained in regulation for Quality Assurance Procedures for Construction, published as 23CFR 637(B) on June 29, 1995. It consists of an Acceptance Program and an Independent Assurance Program (IAP), both of which are based on test results obtained by qualified persons and equipment.

This Quality Assurance Program allows for the use of the contractor's test results for acceptance if satisfactory correlation exists between the contractor's test results and the contracting agency test results in accordance with I.M. 216. The IAP, as presently structured, is conducted exclusively by the contracting agency. The acceptance of all materials and workmanship is the responsibility of the engineer.

http://www.erl.dot.state.ia.us/Apr_2003/IM/content/205.pdf

OHIO

Ohio DOT Procedures in Quality Assurance

Administration of some projects involves a minimum of field inspection by Ohio DOT personnel. In order to accomplish reduced inspection, the Contractor is required to notify the Project Engineer/Supervisor of the necessary inspection of certain items of work to be conducted, in a timely manner, prior to advancing to the next phase of associated work, i.e., prior to backfilling, covering, building upon or otherwise creating a condition whereby the work cannot be visually inspected or readily corrected. These are items of work requiring a high degree of inspection (nearly 100% during performance).

It may be necessary for the District to rotate experienced inspectors from project to project to provide the intended level of inspection required for critical work items.

If the contractor has given proper advanced notice and ODOT personnel do not respond [in a timely manner], the Contractor may proceed according to their schedule. This does not relieve the Contractor of any contractual requirement. In the event the request for inspection is canceled or delayed, the Contractor is required to notify the Project Engineer/Supervisor as far in advance as possible. Cancellations resulting from an Act of God are excluded from this requirement.

Items of work being performed which can be reviewed/inspected at a later date (not covered or buried) will not require the level of inspection described above. However, the Contractor is expected to keep the Project Engineer/Supervisor informed of their scheduled work on these items to permit random inspection and project documentation of work being performed.

OREGON

Oregon Department of Transportation
Quality Assurance Program

http://www.oregon.gov/ODOT/HWY/QA/quality_programs.shtml

Contact: Dustin Haas, ODOT Senior Design QA & QC Engineer Ph: 503-986-3751

The primary role of this level is to monitor design work and quality control programs of individual providers to ensure overall quality, appropriate design practice, completeness and adherence to policy. This element of the program is administered by the Office of Pre-Letting with review support by all Technical Services sections. Projects are sampled from each provider, comprehensively reviewed and performance improvements recommended. Oregon uses Contractor's test results for HMA acceptance in some fashion.

ODOT's Quality Assurance Program Guidebook

ODOT's Quality Assurance Program has been established to ensure continued high standards of quality for transportation projects. According to the ODOT's Guidebook, it says that ODOT will seek to meet Federal Highway Administration requirements as well as those of the Oregon Department of Justice. Timely reviews will be one method used to manage quality. These reviews will, in effect, be an audit of a provider's Quality Control Program. While Quality Control is performed for every project, Quality Assurance reviews will occur only for a representative sampling of projects. While Quality Control is ongoing through the development of a project, a Quality Assurance review will usually occur after project development has been completed and is under construction. Occasionally, projects will be reviewed even after construction has been completed. Conversely, a few projects will receive a Quality Assurance review while still in the project development phase. This will occur only for those projects considered to be "high profile" or "high risk." This type of project is yet to be defined.

Quality Assurance reviews will consist of more than one level of review. A QA "Lite" review will involve representatives from all disciplines to review a shorter list of project elements that are considered to represent the overall quality of the work. A QA "Detailed" review will involve a larger group of representatives from all disciplines and specialty areas for an in depth assessment of the quality of the work. There is also the possibility of a "Lite" review with a discipline focus. This means that the review will be fundamentally based on the elements and process of a "Lite" review, but will also include a detailed review in only a particular discipline or specialty area. There also exists the possible approach of one of these types of reviews being performed on a collection of work from a provider – meaning more than one project – when this is felt to be appropriate. The details on the criteria to determine the type of review are yet to be determined. All QA reviews or evaluations of quality will be done in a consistent, objective, programmatic manner based on the Quality Assurance Review Guidebook. This guidebook will document standards and criteria for all types of Quality Assurance reviews. These reviews will not be a factor in a project schedule.

http://www.oregon.gov/ODOT/HWY/QA/docs/qa_guidebook.pdf

GEORGIA

RENT-A-TECH: Consulting Engineering & Inspection

In an effort to supplement the existing Department staff and to compensate for fluctuating workloads throughout the state, Georgia uses an innovative solution, Rent-A-Tech. In the Rent-A-Tech program, consultant inspectors are assigned to Department Project Engineers within defined geographic areas based on workload demands of various projects within the area. Inspectors may be reassigned regularly during the duration of the consultant contract, as inspection needs dictate. The consultant is responsible for providing inspectors in the numbers outlined in their contract, but must make adjustments to staff levels during the life of the contract, including the need to reduce personnel during lulls in construction activity. In addition to providing qualified inspectors, the consultant also provides a vehicle for each inspector to fulfill the transportation needs of their inspection duties.

Consultants provide Inspector Aids, Inspectors, and Senior Inspectors. Senior Inspectors serve as an on-site liaison between the consultant and the Department in addition to their routine duties.

TEXAS

TxDOT's Quality Assurance Program

Effective Date: June 1, 2005

Purpose: To make the Quality Assurance Program available through the TxDOT Online Manual System.

Thomas R. Bohuslav, P.E., Director, Construction Division, TxDOT Quality Assurance Program

The Texas Department of Transportation (TxDOT) established the Quality Assurance Program (QAP) to ensure that materials and workmanship incorporated into any highway construction project are in reasonable conformity with the requirements of the approved plans and specifications, including any approved changes. This program conforms to the criteria in 23 CFR 637(b). It consists of an "Acceptance Program" and "Independent Assurance (IA) Program" based on test results obtained by qualified persons and equipment. The QAP allows for the use of validated contractor-performed quality control (QC) test results as part of an acceptance decision. It also allows for the use of test results obtained by commercial laboratories in the IA program, as well as in acceptance decisions. The acceptance of all materials and workmanship shall be the responsibility of the engineer. For more information or questions regarding the manual content, contact the Construction Division, Materials & Pavements Section at 512/506-5803 or dbelser@dot.state.tx.us.

<ftp://ftp.dot.state.tx.us/pub/txdot-info/gsd/manuals/qap.pdf>

ILLINOIS

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A telephone interview was conducted with Lee Gallivan, and he provided considerable background in this issue. He cautioned using contractor QA/QC without proper oversight and controls in place. The State of Illinois had undertaken it resulting in considerable problems with lack of compliance by contractors. Lee is available for consultation if WDSOT wishes and is willing to bring a team out to the state to advise on procedures to use to protect the state from fraud and abuse.

Illinois Department of Transportation

Construction Inspector's Checklist for Contract Administration

This checklist has been prepared to provide the Resident Engineer a summary of easy-to-read step-by-step requirements relative to Contract Administration. The following questions are based on information found in the Standard Specifications, Construction Manual, Policy Memorandums, and letters.

www.dot.state.il.us/constructionmanual/formsandreports.html

INDIANA

The Indiana Department of Transportation has, on a select basis, used consultants for contract administration and inspection. They no longer do after experiencing a number of problems with lack of contractor compliance.

According to Lee Galivan, of the Indiana FHWA, 33 states use some form of Contractor QA/QC, but 30 of them have bad systems without proper controls. States still need to run tests independently of what the contractor does and verify results. The system is ripe for abuse, so according to Lee, it is imperative that state's have a clearly defined review process and not just accept the contractor's results. Doing this, however, requires state staff, so no staff savings are usually realized.

INDOT had hoped to use performance contracting to reduce the need for their testing and inspection. QC/QA must be in place to get to performance based contracting. Indiana developed a warranty specification for mainline asphalt pavement. The contractor was responsible for quality control and no testing or inspection was done for the mainline asphalt pavement. The contractor was responsible for the pavement for five years. This hoped to reduce staff requirements but not all contracts can be warranted.

Indiana developed a contractor acceptance testing specification in 1996. The contractor was to provide a quality control plan for the work with statistical tolerance limits for verification testing by the department. A pilot contract with this specification was let in 1996 and three more contracts with this feature were built in 1997, and six more contracts with this feature were let in 1998. After refinement, it was hoped the specification would reduce staffing needs. According to FHWA official, Lee Galivan, this did not happen. There were numerous problems with significant lack of compliance by contractors and state staff did not verify tests. Verification—a percent within limits is one way to do this. The amount of staff required for oversight did not significantly reduce staffing needs.

http://www.in.gov/dot/div/testing/manuals/superstructure/chapter_01.pdf

MINNESOTA

Minnesota modified their specifications and procedures to improve methods. As a side benefit, these changes resulted in a reduction in MNDOT personnel being required on a project. Examples of changes that have been made are listed below:

MNDOT uses end result specifications and started with a QC/QA program in the bituminous area, and then went to other areas. With the shift to the contractor performing quality control testing, there was a reduction in the personnel needs on a project, but the addition of quality assurance testing by MN/DOT has reduced slightly the gains made by this change.

Many Minnesota construction contracts now require the contractor to provide survey crew staking from control points provided by the Department. This change was made in response to manpower shortages.

Minnesota used pilot projects to gain experience with design/build. As a next step in this evolution, they considered a design-build-maintain-warranty project that involves primarily asphalt surfacing.

SOUTH CAROLINA

Development of a Quality Assurance Program for Asphalt Paving Mixtures in South Carolina

A Joint Agency/Industry Quality Assurance Committee (QA committee) was created to evaluate and recommend potential modifications to the existing SCDOT hot mix asphalt (HMA) specification that used percent within limits (PWL) for determining acceptance. The QA committee was made up of SCDOT, contractor, and FHWA personnel selected by the SCDOT. The research principal investigator (PI) served as the facilitator for the QA committee.

To establish how well the PWL specification was working in the field and to uncover any problems users of the specification encountered, interviews were conducted with both SCDOT and contractor personnel. To ensure that all parties would feel free to give their honest opinions and experiences regarding the specification, separate interviews were held with contractor and SCDOT personnel.

UTAH

Utah's QA/QC Requirements

Quality Control Elements and Example Plans

Elements of a QC Plan

- Example QC Plan for Hot Mix Asphalt
- Example QC Plan for Structural Concrete
- Example List of QC Requirements for PCC Transport and Placement

http://www.udot.utah.gov/dl.php/tid=644/save/8b_app-B.pdf

Publications and Professional Journals

TITLE: CONTRACTOR-PERFORMED QUALITY CONTROL: IS THE FOX GUARDING THE HENHOUSE?

AUTHOR(S): Mahboub-KC; Hancher-DE; Wang-Y

SOURCE: Journal of Prof Issues in Engineering Education and Practice. 2004/10. 130(4) pp255-258 (3 Tab., 12 Ref.)

PUBLISHER: American Society of Civil Engineers, 1801 Alexander Bell Drive, Reston, VA, 20191-4400, USA

PUBLICATION YEAR: 2004

ISSN: 1052-3928

LANGUAGE OF DOCUMENT: English

ABSTRACT: At the same time that state departments of transportation are allowing contractor-performed quality control, they are also concerned about using the contractor-reported data for acceptance and payment purposes. The question becomes, is the fox in charge of guarding the chickens? To address this concern, a large number of asphalt and concrete projects in Kentucky (United States) were examined. The statistical analyses showed that, for the most part, there is no significant difference between the contractor-performed acceptance data and concomitant highway agency-performed verification data. This is obviously a very encouraging finding that is expected to enhance the level of trust between the contractors and highway agencies.

TITLE: DESIGN-BUILD: STAYING AHEAD OF THE CURVE.

AUTHOR(S): Groff-MJ; Berry-MR

SOURCE: Airport Magazine. 2003/11. 15(6) pp44-45

PUBLISHER: AAE Service Corporation, Incorporated, 4212 King Street, Alexandria, VA, 22302, USA

PUBLICATION YEAR: 2003

LANGUAGE OF DOCUMENT: English

ABSTRACT: The design-build approach is becoming increasingly popular for airport construction projects. This article discusses how design-build works, the benefits of the design-build approach over the traditional design-bid-build model, and the keys to design-build success. Design-build

has become more popular as owners become more familiar with the approach and as studies and pilot projects have demonstrated the quality and cost-efficiency of design-build projects. Many of the barriers to design-build found in public procurement statutes have also been removed. To achieve success in a design-build project, owners must efficiently manage and administer design-build efforts through the project's life, from procurement to implementation. Critical issues to consider include: adequate definition of the owners program, fair and balance selection process, proper contractual risk allocation, design review and approval, quality control/quality assurance, and change order management.

TITLE: CONTRACTOR PERFORMED QUALITY CONTROL ON KYTC PROJECTS.

AUTHOR(S): Hancher-DE; Wang-Y; Mahboub-KC

CORPORATE AUTHOR(S): University of Kentucky, Lexington, Kentucky Transportation Center, Lexington, KY, 40506-0281, USA; Kentucky Transportation Cabinet, State Office Building, 501 High Street, Frankfort, KY, 40622, USA; Federal Highway Administration, 400 7th Street, SW, Washington, DC, 20590, USA

SOURCE: 2002/08. pp131 (Figs., Tabs., Refs., 5 App.)

PUBLICATION YEAR: 2002

REPORT NUMBER(S): Report Number: KTC-02-26/SPR-01-222-1F, Report Number: Final Report; Contract/Grant Number: KYSPR-01-222

LANGUAGE OF DOCUMENT: English

ABSTRACT: This report addresses issues related to transferring the responsibility for quality control from the Kentucky Transportation Cabinet (KyTC) to construction contractors. Surveys of the KyTC, other state departments of transportation, and Kentucky highway contractors were done to identify the advantages, concerns, and modifications of the Contractor Performed Quality Control (CPQC) program. An advisory committee of experienced KyTC engineers, Federal Highway Administration representatives, and contractor representatives met periodically to identify approaches for handling key issues of the program. Several key topics related to CPQC are presented in this report, with emphasis on quality control/quality assurance (QC/QA) administration, QC/QA procedures, quality acceptance and verification testing, and CPQC training. Specific issues related to CPQC pay items in Kentucky are also discussed. Several recommendations have been proposed to enhance the program. If properly implemented, CPQC can improve a contractor's work performance and help relieve the State's burden for inspection. Additional monitoring of the program is necessary to make further improvements and to include other pay items.

TITLE: CONTRACTOR-LED QUALITY CONTROL AND QUALITY ASSURANCE PLUS DESIGN-BUILD: WHO IS WATCHING THE QUALITY?

AUTHOR(S): Ernzen-J; Feeney-T

SOURCE: Transportation Research Record. 2002. (1813) pp253-259 (3 Fig., 7 Tab., 2 Ref.)

SOURCE NOTES: This paper appears in Transportation Research Record No. 1813, Construction 2002.

PUBLISHER: Transportation Research Board, 500 Fifth Street, NW, Washington, DC, 20001-, USA

PUBLICATION YEAR: 2002

ISSN: 0361-1981

REPORT NUMBER(S): 0309077397

LANGUAGE OF DOCUMENT: English

ABSTRACT: Recent innovations by the Arizona Department of Transportation (DOT) in the use of design-build procurement for highway construction are presented. Explosive population growth in Arizona has pushed its DOT to the limits of its capacity and has challenged the department to develop innovative ways to stretch its resources to meet its constituents' needs. In 1996 the department spearheaded the passage of a pilot design-build law aimed at completing public-sector construction projects more rapidly than could be done by traditional methods. An evaluation of the material quality program used in the second design-build project in this program is described. The project reconstructed an extremely congested 7-mi segment of Interstate 17, a primary artery carrying 180,000 vehicles per day through the city of Phoenix, widening it from 6 to 10 lanes. The design-build contract was awarded after A+B bidding, which considered the bid

price to do the work and the time required to complete the project, and was the largest ever awarded at the time. It was won by a design-builder who implemented a very aggressive schedule that required double-shift work for nearly 2 years. In another contracting first, the agency also assigned the design-builder responsibility for the quality control and quality assurance functions on the project, with Arizona DOT providing verification sampling and testing only. The concrete compressive strength and material density for the project are examined and are compared to statewide averages for traditional design-bid-build projects in which Arizona DOT performed the quality assurance function. Analysis of the data shows that despite a highly compressed schedule, the quality of the material on the project exceeded the project specifications and was similar to the quality of work completed for the state under traditional contracting methods with an Arizona DOT-operated quality assurance program.

TITLE: ISSUES RELATED TO USE OF CONTRACTOR QUALITY CONTROL DATA IN ACCEPTANCE DECISION AND PAYMENT: BENEFITS AND PITFALLS.

AUTHOR(S): Killingsworth-BM; Hughes-CS

SOURCE: Transportation Research Record. 2002. (1813) pp249-252 (4 Ref.)

SOURCE NOTES: This paper appears in Transportation Research Record No. 1813, Construction 2002.

PUBLISHER: Transportation Research Board, 500 Fifth Street, NW, Washington, DC, 20001-, USA

PUBLICATION YEAR: 2002

ISSN: 0361-1981

REPORT NUMBER(S): 0309077397

LANGUAGE OF DOCUMENT: English

ABSTRACT: Several agencies throughout the United States use contractor data as a means of acceptance. This is a permissible practice as long as certain safeguards are in place and as long as the functions of quality control and quality acceptance remain separate. The benefit of this type of procedure is potential decreases in the personnel and testing facilities required by the state agency. However, this type of approach for acceptance also has inherent risks. In most cases, the changes required to implement a system in which contractor data are used in the acceptance decision are more philosophical than technical. In other words, the amount of testing that the contractor will have to do to meet the requirements of the change will more than likely be about the same as (or only slightly more than) that undertaken in the current specification system. However, even though a state agency may see a drop in the amount of testing required to support acceptance, it will now be faced with the fact that it must trust the contractor's data for determination of pay factors and, ultimately, acceptance of the work. Thus, when the procedure of contractor testing used for acceptance is fully implemented, there will be two major impacts on a state agency. One is a psychological adjustment for agency personnel to assimilate the fact that contractor test results will be used to establish the pay factor. Discussion is needed to address this adjustment, and the state should plan training sessions to address the reasons for this decision and the importance of the steps that will be taken to implement it. The other impact will be the need to implement and monitor the validation system.

Other Sources

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Report on Limits of Use of Contractor Performed Sampling and Testing in Federal Highway Administration Programs, Robert Bohman, et al, Federal Highway Administration, March 1993.

Materials Control and Acceptance - Quality Assurance, NHI Course Number 134042A, Federal Highway Administration, National Highway Institute. <http://www.nhi.fhwa.dot.gov> .

Scan Tour of Performance Based Contracting Issues
Contract Administration: Technology and Practice in Europe
October 2002

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Performance specifications are critical elements of performance contracting. In the Netherlands, the Highways Agency has extensive experience with drafting performance specifications. The Dutch are testing a series of 60 pilot projects to measure performance contracting versus traditional prescriptive methods. They define performance specifications in five levels of requirements that range from roaduser wishes to requirements for basic materials and processing. Performance specifications detail both the operating level and minimum condition of the facility at the time it is returned to public ownership.

An area of concern in performance contracting in the United States is quality assurance/quality control (QA/QC). Traditional QA/QC roles and responsibilities in the United States can impede the effectiveness of performance contracting. Performance contracts observed by the scan team placed the responsibility for QC solely with the contractor, and the owner retained only a minimal QA role. Owner QA

is built into the process at various "stop" or "control" points on projects. There also are unique processes for penalty points and quality audits in lieu of heavy owner inspection. In one instance, the owner gives the contractor yellow or red cards for quality violations, like a referee in a soccer game. One yellow card is a warning and allows the contractor to correct work while improving its process or fixing the problem. Two yellow cards, or one red card, mean that the contractor must stop work until the violation is remedied.

Systems Approach to Insuring Quality

The following document summarizes the West Virginia Department of Highways quality assurance and quality control philosophy.

Note: This is a lengthy report. You may wish to save the report to your hard drive and read it at a later time.

This paper was originally presented to the 1996 Road Builders Clinic Coeur d'Alene, Idaho March 11-13, 1996 by Gary L. Robson of the West Virginia Division of Highways. We have heard many times about the need to do more with less. Because of budget restraints, personnel cuts, or whatever, there is just not enough money or people available to do everything we need to do in our industry. While the reasons may be different, the problem is the same as it was some 30 years ago; the need to do more with less.

Available Resources from FHWA

The following resources are currently available for assistance in dealing with issues related to Quality Assurance:

The guideline for these reviews is available on the FHWA Office of Pavement Technology web site. It is available at http://www.fhwa.dot.gov/pavement/materials_notebook/qareview.htm

"23 CFR Part 637," Subpart B - Quality Assurance Procedures for Construction, Federal Highway Administration, Federal Register, Washington, DC, April 2003, http://www.access.gpo.gov/nara/cfr/waisidx_03/23cfr637_03.html

Non regulatory supplement for 23 CFR Part 637, Subpart B - Quality Assurance Procedures for Construction, Federal Highway Administration, <http://www.fhwa.dot.gov/legsregs/directives/fapq/0637bsup.htm>

Technical Advisory 6120.3, "Use of Contractor Test Results in the Acceptance Decision, Recommended Quality Measures, and the Identification of Contractor/Department Risks", Federal Highway Administration, August 2004. It is available at <http://www.fhwa.dot.gov/legsregs/directives/techadvs/t61203.htm>

Frequently asked Questions on the Quality Assurance Regulation
<http://www.fhwa.dot.gov/pavement/materials/matnote11.cfm>

Products to Improve Concrete Pavement Performance
August 2005 FHWA-IF-05-030

The Concrete Pavement Technology Program (CPTP) is a national program of research, development, and technology transfer that operates within the Federal Highway Administration (FHWA) Office of Pavement Technology.

The CPTP includes some 30 research and demonstration projects, each of which is delivering products for improved design, construction, repair, and rehabilitation of concrete pavements (see table below). The focus of the program is on cost-effective designs and procedures for long-life performance of Federal-aid highways.

<http://www.fhwa.dot.gov/pavement/concrete/pcpp805.cfm>

Quality Assurance Stewardship Reviews and Products

Date: February 17, 2004

From: /s/ Original signed by:

King W. Gee

Associate Administrator for Infrastructure

To: Directors of Field Services

Resource Center Managers

Division Administrators
Federal Lands Highway Division Engineers

Quality assurance practices provide one of the most effective means of controlling and improving construction quality. As such, the FHWA considers the use and implementation of sound quality assurance practices to be a critical element in each State's construction program.

In undertaking their construction program management and stewardship responsibilities, the FHWA Division Offices should provide an adequate level of effort toward monitoring, evaluating and improving their States' quality assurance practices. Several initiatives are currently underway to facilitate this effort. This year, the Office of Infrastructure will be conducting several Quality Assurance Stewardship Reviews of State construction quality processes and procedures. These process/program reviews will be continued in future years and will include reviews for other areas of high importance to the States' construction program. The reviews are intended to complement and support the Divisions' evaluation and oversight of the States' program, and provide a national perspective of the program area. We are available to discuss your interest in scheduling these reviews and others for your State.

<http://www.fhwa.dot.gov/construction/021704.htm>

Training

A contract has been awarded for the delivery of NHI Course 134042, "Materials Control and Acceptance - Quality Assurance." The course is four days long and covers the basic essentials of QA. A two-day version of the course is also available.

A 1-day workshop titled "PWL Basic" was offered by the FHWA Office of Pavement Technology starting in the spring of 2006.

A 1 day workshop titled "PWL Specifications: A Risk Analysis Approach" will be offered by the FHWA Office of Pavement Technology starting in the fall of 2006.

"Optimal Procedures for Quality Assurance Specifications", Publication No. FHWA-RD-02-095, Federal Highway Administration, Washington, DC, April 2003, <http://www.tfrc.gov/pavement/pccp/pubs/02095/>

"Evaluation of Procedures for Quality Assurance Specifications", Publication No. FHWA-HRT-04-046, Federal Highway Administration, Washington, DC, October 2004

The rewrite of the AASHTO Standard Recommended Practice R 9-05, "Acceptance Sampling Plans for Highway Construction" has been published in the 2005 AASHTO Standards. This guide will assist the States in developing specifications.

Status of other Quality Assurance Activities

The following resources are being developed to address issues that are not being covered:

A software package is being developed by FHWA as a tool to help analyze risks associated with Percent Within Limit (PWL) specifications. The software will be completed in the summer of 2007.

The Quality Assurance Technologist Course that was developed by the New England Transportation Technician Certification Program (NETTCP) has been finalized and will be available shortly through the Transportation Curriculum Coordination Council (TCCC).

A contract for developing NHI Course 134059 - "Quality Assurance Specification Development and Validation Course" is expected to be awarded during the summer of 2007. The course is expected to be available by the end of 2008. The course will use the software that is currently being developed to assist the States in developing and validating the risks associated with QA specifications.

A task order is being developed with the National Center for Asphalt Technology (NCAT) to explore innovative methods for the acceptance of materials.