Analysis of Construction Quality Assurance Procedures on Federally Funded Local Public Agency Projects

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U.S. Department of Transportation
Federal Highway Administration

Research, Development, and Technology
Turner-Fairbank Highway Research Center
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McLean, VA 22101-2296

FOREWORD

The Federal Highway Administration (FHWA) is interested in identifying challenges and best practices related to construction quality assurance (QA) for local public agency (LPA) projects, making recommendations to improve the effectiveness of both State transportation department oversight and LPA management of construction QA and ensure that construction QA complies with Federal-aid requirements. In response to prior Federal and State reviews that have found significant weaknesses or inconsistencies in construction QA practices for LPA projects, this report documents current construction QA practices from both State transportation department and LPA perspectives, identifies specific issues or areas of weakness in QA practices, identifies existing successful QA practices, and makes recommendations that can be implemented to generally improve construction QA across the full spectrum of LPA projects and State transportation department programs. One proven method to improve the consistency and effectiveness of construction QA is to develop a robust LPA certification process. Other key recommendations include the development of LPA-tailored specifications and standards, construction QA-specific training, and use of a risk-based or tiered system of construction QA based on the LPA project purpose and scope.

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Research and Development

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16. Abstract
Approximately 20 percent of the Federal-aid highway program is invested in local public agency (LPA) infrastructure projects, which is a significant portion of total Federal funds allocated to highway construction projects in the United States. In response to previous Federal and State reviews that have found significant weaknesses or inconsistencies in construction quality assurance (QA) practices for LPA projects, this report documents current construction QA practices from both State transportation department and LPA perspectives, identifies specific issues or areas of weakness in QA practices, identifies existing successful QA practices, and makes recommendations that can be implemented to generally improve construction QA across the full spectrum of LPA projects and State transportation department programs. Recognizing that there are significant differences in LPA capabilities and project types, the recommendations consider both large and small LPAs, and differences among State transportation department programs. The recommendations applicable to all project types and programs include better communication among project partners through stakeholder meetings, QA training, and statewide LPA guidelines and manuals focusing on construction QA. For larger LPAs with more capabilities, LPA-tailored specifications and standards, LPA certification, and the use a risk-based or tiered system of construction QA based on project purpose and type are recommended. For smaller LPAs with fewer resources, continued State transportation department oversight and independent assurance and the use of qualified consultants for construction QA are recommended.

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SI* (MODERN METRIC) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
		LENGTH		
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
		AREA		
in^2	square inches	645.2	square millimeters	mm^2
ft^2	square feet	0.093	square meters	m^2
yd^2	square yard	0.836	square meters	m^2
ac	acres	0.405	hectares	ha
mi^2	square miles	2.59	square kilometers	km^2
		VOLUME		
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft^3	cubic feet	0.028	cubic meters	m^3
yd^3	cubic yards	0.765	cubic meters	m^3
		NOTE: volumes greater than 1000 L shall be shown in m^3		
		MASS		
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
		TEMPERATURE (exact degrees)		
°F	Fahrenheit	5 (F-32)/9 or (F-32)/1.8	Celsius	°C
		ILLUMINATION		
fc	foot-candles	10.76	lux	lx
fl	foot-Lamberts	3.426	$candela/m^2$	cd/m^2
		FORCE and PRESSURE or STRESS		
lbf	poundforce	4.45	newtons	N
lbf/in^2	poundforce per square inch	6.89	kilopascals	kPa

APPROXIMATE CONVERSIONS FROM SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
		LENGTH		
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
		AREA		
mm^2	square millimeters	0.0016	square inches	in^2
m^2	square meters	10.764	square feet	ft^2
m^2	square meters	1.195	square yards	yd^2
ha	hectares	2.47	acres	ac
km^2	square kilometers	0.386	square miles	mi^2
		VOLUME		
mL	milliliters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m^3	cubic meters	35.314	cubic feet	ft^3
m^3	cubic meters	1.307	cubic yards	yd^3
		MASS		
g	grams	0.035	ounces	oz
kg	kilograms	2.202	pounds	lb
Mg (or "t")	megagrams (or "metric ton")	1.103	short tons (2000 lb)	T
		TEMPERATURE (exact degrees)		
°C	Celsius	1.8C+32	Fahrenheit	°F
		ILLUMINATION		
lx	lux	0.0929	foot-candles	fc
cd/m^2	$candela/m^2$	0.2919	foot-Lamberts	fl
		FORCE and PRESSURE or STRESS		
N	newtons	0.225	poundforce	lbf
kPa	kilopascals	0.145	poundforce per square inch	lbf/in^2

*SI is the symbol for the International System of Units. Appropriate rounding should be made to comply with Section 4 of ASTM E380.
(Revised March 2003)

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LIST OF ABBREVIATIONS

AASHTO	American Association of State Highway and Transportation Officials
ACEC	American Council of Engineering Companies
ADA	Americans with Disabilities Act
APWA	American Public Works Association
ARRA	American Reinvestment and Recovery Act
CA	Certified Agency
Caltrans	California Department of Transportation
CDOT	Colorado Department of Transportation
CEI	Construction Engineering and Inspection
CFR	Code of Federal Regulations
EDC	Every Day Counts
EEO	Equal Employment Opportunity
FDOT	Florida Department of Transportation
FHWA	Federal Highway Administration
GDOT	Georgia Department of Transportation
HMA	Hot Mix Asphalt
IA	Independent Assurance
IDT	Idaho Department of Transportation
LAP	Locally Administered Project (Program)
LPA	Local Public Agency
LTAP	Local Technical Assistance Program
MaineDOT	Maine Department of Transportation
MC	Management Consultant
MDOT	Mississippi Department of Transportation
Mn/DOT	Minnesota Department of Transportation
NACE	National Association of Corrosion Engineers
NCDOT	North Carolina Department of Transportation
NCHRP	National Cooperative Highway Research Program
NHDOT	New Hampshire Department of Transportation
NHS	National Highway System
ODOT	Ohio Department of Transportation
OE	Open Ended
OIG	Office of Inspector General
Oregon DOT	Oregon Department of Transportation
PMIT	Project Management Improvement Team
QA	Quality Assurance
QAP	Quality Assurance Program
QAR	Quality Assurance Review
QC	Quality Control
QPL	Qualified Products List
ROW	Right-of-Way
SAFETEA-LU	Safe, Accountable Flexible, Efficient Transportation Equity Act: A Legacy for Users
SHS	State Highway System

S&O	Stewardship and Oversight
VDOT	Virginia Department of Transportation
WisDOT	Wisconsin Department of Transportation
WSDOT	Washington State Department of Transportation

EXECUTIVE SUMMARY

INTRODUCTION

All Federal-aid projects on the National Highway System (NHS)—including those administered by local public agencies (LPA)—are subject to the quality assurance (QA) procedures in 23 CFR 637, Subpart B—Quality Assurance Procedures for Construction, applied by the Federal Highway Administration (FHWA) to any projects using Federal-aid funds.[1] NHS projects are defined in 23 CFR Part 470—Highway Systems, as the following:

> [I]nterconnected urban and rural principal arterials and highways (including toll facilities) which serve major population centers, international border crossings, ports, airports, public transportation facilities, other intermodal transportation facilities and other major travel destinations; meet national defense requirements; and serve interstate and interregional travel. All routes on the interstate system are a part of the National Highway System. (p. 134)

For projects off the NHS, generally described as local roads or rural minor collectors, the established procedures approved by the State transportation department can be used for material acceptance as long as they satisfy the intent of the Federal requirements. In accordance with 23 CFR 637, a comprehensive construction QA program should consist of the following core elements: quality control, acceptance, independent assurance (IA), dispute resolution, personnel qualification, and laboratory accreditation/qualification.

National reviews of locally administered projects conducted by FHWA in 2006 and the Office of Inspector General (OIG) from November 2009 through April 2011 revealed shortcomings not only in the efforts of LPAs to properly administer Federal-aid projects, but also in the role and effectiveness of oversight activities performed by the FHWA Division Offices and the State transportation departments to ensure LPA compliance with Federal requirements.[2,3] One primary area of concern was with the oversight of construction quality. The FHWA report stated, "The team found that design and construction quality was highly variable, and the quality and availability of records made it difficult to verify compliance. It was also determined that material testing was often either not done or was undocumented leaving project quality and durability questionable."[2] (p. 9) These reviews indicate that the construction QA practices on many locally administered Federal-aid projects are in need of improvement. However, before improvements can be made, a more detailed understanding of the problem was needed from both the State transportation department and LPA perspectives.

PURPOSE

This report summarizes a comprehensive investigation of current construction QA practices from both State transportation department and LPA perspectives undertaken in 2012 and presents recommendations from that investigation. The review included a content analysis of current State transportation department and LPA QA procedures, a national State transportation department/LPA survey of construction QA practices, and indepth interviews of a selected cross-section of State and local agency representatives. The recommendations resulting from this review focused on the current state of practice, issues or challenges, and best practices to

improve construction QA. Some of the specific areas identified in previous reviews and the project surveys and interviews include the development of LPA-specific guidelines and manuals, quality management by the State transportation department, use of consultants, certification programs, and training. Related topics, such as communication, specifications and standards, and risk-based tiered systems for LPA projects, were also raised and analyzed as part of this review.

FINDINGS

Although the findings generally indicated that the elements required under 23 CFR 637 have been incorporated into LPA construction QA programs, the LPA-specific QA specifications, procedures, and guidelines still vary considerably as do the FHWA/State transportation department stewardship agreements. Furthermore, the LPA QA programs vary to an even greater extent in terms of how construction QA is implemented, the level of QA expertise within the LPA, adequacy of documentation, and the level of oversight provided by the State transportation departments. This variability was in part owing to differences in the size and sophistication of the LPAs.

From the State transportation department perspective, the findings generally indicated that while there were still significant issues related to compliance with QA procedures, QA documentation, frequency of sampling and testing, and communication, few instances of poor quality or rework on LPA projects were actually reported. The worst-case outcomes involved withholding of Federal funds, most often related to non-compliance with QA procedures or lack of documentation. From the LPA perspective, the most important issues were the cost of construction QA for federally funded projects, particularly the cost of compliance with Federal-aid construction QA requirements. The larger LPAs were generally in favor of assuming more responsibility and control of construction QA through certification or other means. Smaller LPAs with fewer resources were in favor of greater State transportation department oversight and consultant involvement in construction QA.

In terms of best practices for construction QA on LPA projects to the address the issues reported by the respondents, a number of strategies were cited. These included use of LPA-specific specifications and guidance documents, QA training, improved communication, consultant oversight, and certification of LPAs. These practices were evaluated in greater depth, and recommendations are presented in the following sections.

The challenge for FHWA will be to improve State transportation department oversight of QA procedures and to develop practical QA procedures for LPAs, while taking into account how to make the process more efficient for the various types, sizes, and scopes of LPA projects that receive Federal funds. Ideally, most of the recommendations can be addressed and implemented at the LPA (project) level, or at the State level. Others may require action by the FHWA Division Office or Headquarters. This consideration will inform the best practices identified by the research and any future research needs. In parallel with this work, the FHWA Every Day Counts (EDC) 2 Initiative has developed a three-pronged strategy (certification programs, consultant services, and stakeholder partnering) to assist LPAs with the complexities of Federal-aid requirements and processes, while focusing in part on streamlining the delivery of LPA projects.[4]

RECOMMENDATIONS

Development of LPA-Specific Guidelines and Manuals

The majority of State transportation departments have developed LPA guidance manuals; however, these manuals reveal extreme differences in the breadth and depth of information provided to assist the LPAs. Several manuals focus primarily on preconstruction issues, such as project selection, utility and railroad coordination, and right-of-way acquisition, with little guidance provided for construction administration and QA.

State transportation departments should develop and maintain LPA-specific guidance manuals or LPA project delivery manuals, which cover all of the project types and include sections that specifically address QA in construction. Improved compliance with Federal-aid QA requirements will result from the implementation of LPA-specific guidance manuals with more robust construction QA guidance.

LPA-Tailored Specifications and Standards

Some State transportation departments have developed LPA-specific specifications. The development of LPA-specific materials and construction specifications that are more suitable for a particular LPA project purpose is a worthwhile investment with the potential to reduce the number of instances of the FHWA withholding Federal funds.

Several State transportation departments require the use of the standard specifications on State projects. While this practice simplifies the QA oversight of LPA projects for the State transportation department, it may not result in the most cost effective approach to meeting those QA requirements and may place more of a cost burden on the LPAs than necessary to achieve construction quality for less critical projects. It is recommended that State transportation departments currently using this approach should consider piloting a project with LPA-tailored specifications that provide more flexibility in QA requirements and then assess the benefits to both the State transportation department and the LPA.

Risk-Based Tiered QA System for LPA Projects

Quality management by the State transportation department can be tailored to the LPA type, size, or project risk/complexity. For larger "certified" LPAs, State transportation department oversight may be limited to risk-based annual reviews or audits. For smaller or non-certified LPAs, the State transportation department or its consultant staff may perform IA services, conduct periodic site visits and inspections, or provide full-time consultant inspection services and closeout QA reviews and audits.

In the effort to make LPA project delivery more effective and efficient, the expectations of quality should be more closely aligned with the LPA project purposes. The materials sampling and testing activities for QA could be potentially revised to be more of a risk-based (or tiered) system that considers the LPA project's purpose and scope. The options for establishing a risk-based system could be based on a project cost threshold or on the criticality of the project or the element to be constructed. For more critical projects or elements, more frequent site inspections and/or testing would be required. It is clear that the move to a risk-based system should be

calibrated to each particular State. Random site visits or QA audits would be applied in conjunction with the delegation of approval authority and responsibilities within a State transportation department, particularly for less critical projects where the risks to QA are lower.

This recommended delegation of certain responsibilities to the State transportation department regional level would serve to streamline internal State transportation department approvals and reviews on LPA projects, as well as allow better tracking of LPA staff levels and capabilities. Implementation and maintenance of an integrated electronic tracking system for LPA projects would be instrumental in successfully delegating responsibilities.

Use of Consultants

The use of consultants for QA management of LPA projects can present both challenges and benefits to agencies. Many State transportation departments require that LPAs hire consultants on all federally funded projects, regardless of the project's purpose, which has the potential to significantly increase project costs. Therefore, a State transportation department should establish criteria for which types of LPA projects require the use of consultants (e.g., a tiered level of effort) to allow smaller LPAs to use more of the Federal funds on construction of project components as opposed to project management.

Hiring of management consultants to help ensure that Federal-aid QA requirements are met for the QA activities related to the LPA program is an effective practice for a State transportation department that does not have adequate staff to cover the number of active LPA projects at any given time. However, the State transportation department is required to maintain involvement and oversight in the LPA program and use program reviews or audits at a specified frequency to ensure that there is consistent oversight and no evidence of conflict of interest between the different levels of consultants involved in the overall LPA program, in accordance with 23 CFR 172.9(a), 23 CFR 635.105, and FHWA Memo, *Action: Responsible Charge*.[5,1,6]

Certification Programs

A significant number of State transportation departments have adopted LPA certification or qualification programs, as recommended through the FHWA EDC 2 2012 initiative. These programs use criteria for LPAs to ensure that the LPA is qualified to manage project activities that use Federal-aid funds. The benefits of a certification program may include the improved compliance, risk mitigation, resource and cost reduction, and local ownership (allowing certified LPAs to manage and own their projects).[4] However, more clarity is needed to define what the criteria for LPA certification should be, particularly for QA.

Smaller LPA Programs

Smaller LPAs generally prefer more involvement and guidance from the State transportation department if the latter has adequate staff to manage the construction phase of federally funded projects on behalf of the LPAs. When the State transportation department does not have adequate staff, it is recommended that consultants be used for oversight in a management role or for inspection and testing. In these States, IA typically will also be managed by the State transportation department rather than the LPAs. If the State transportation department will be

performing the IA on an LPA project, it can be challenging to keep track of ongoing testing to schedule the requisite IA activities; thus, LPAs should cooperate fully with the State transportation department's IA personnel. For large projects, the use of a system-based approach to IA (in which IA frequency is based on covering all active testers and equipment over a period of time, independent of the number of tests completed on a particular project) can also be an effective strategy.

Larger LPA Programs

Larger LPAs may prefer more autonomy and retention of administrative control of QA and other costs in the construction of federally funded LPA projects. The implementation of an LPA certification program would allow larger agencies to take more responsibility for QA. Any certification programs in which the LPA will have full responsibility for QA should also have a recertification program that includes mandatory periodic training that all LPA engineering and/or public works staff should attend. The State transportation department is still required by Federal regulations to conduct its routine random audits on the large agencies that are certified through the use of a system-based IA program.

Larger agencies seeking certification should conduct a demonstration project before being permitted more independence with QA of construction and materials. This will provide the State transportation department with the opportunity to assess an LPA's capabilities in performing quality oversight and the appropriate QA documentation. It is advisable that projects with critical elements be selected as the demonstration projects to be used for the decision in certifying or recertifying an LPA.

Training

The training of LPAs and their consultants has a high level of effectiveness in reducing the frequency of issues with QA, in particular when the instructional content covers certification, inspection, testing, documentation, and other QA-related activities for both LPA and State transportation department staff.

General training on LPA contract administration should be supplemented with more specific targeted training related to use of electronic systems and forms, as well as QA inspection and testing for specific project types or elements. Because of the high incidence of staff turnover and low budgetary resources at LPAs, web-based training should be developed as an alternative or supplementary measure to classroom training.

Training should be parceled out in shorter segments (less than 1 h in length) to keep each module concise, but also to be indepth and focused on current challenges. The State transportation departments should work with their FHWA division counterparts to dedicate long-term funding for the development and maintenance of these training courses.

Future training topics should include: system-based and project-based IA programs; estimation techniques for the cost of construction engineering, including the construction engineering and inspection and testing consultants; importance and impact of materials sampling frequency; daily construction records for LPA projects; construction dispute resolution for LPA projects; and management of materials testing subcontracts.

Communications

Communication practices, such as periodic stakeholder partnering or community of practice meetings with all of the project players, as recommended by through the FHWA EDC 2 program, can improve the understanding of Federal-aid project requirements. Effective project-level practices include the requirement of specific QA plans for LPA projects and State transportation department attendance at pre-design walkthroughs and pre-construction meetings to define required roles and responsibilities earlier as well as identify issues early on before design.

The success of LPA projects in the construction phase can be attributed to frequent communication between the LPA staff and the State transportation department construction and IA staff; however, the communication should be strategic and clear, as well as extend beyond training.

FHWA can work with the State transportation departments to establish mitigation plans on a periodic basis to track how well the policies and practices related to the mitigation of materials and construction QA issues are working. It is also an opportunity to identify any new issues that have evolved and require the generation of new guidance, training, or tools for the State transportation departments and LPAs.

CONCLUSIONS

The Federal funds available to sub-recipients through the LPA program offers the opportunity for further improving the vast network of secondary roads and minor arterials that are often in need of major repairs. While smaller LPAs generally lack the resources to consistently and correctly complete the QA documentation required on federally funded projects, the larger LPAs have the training, staff qualifications, and capabilities to take on more of the QA role. It is recommended that a tiered system should be considered by State transportation departments in the certification of LPAs, in which the projects awarded to smaller LPAs are managed either by consultants (hired by either the State transportation department or the LPA) or by the State transportation department itself. There were reported benefits and challenges for both types of management strategies, and it would be up to an individual State transportation department to decide how it would address these challenges in its particular State.

CHAPTER 1. INTRODUCTION

BACKGROUND

Federal-aid projects administered by local public agencies (LPA) provide the opportunity for all three levels of government (Federal, State, and local) to partner for the purposes of building better communities and developing and improving our highway system. As summarized in figure 1, each of these entities assumes a distinct role in the delivery of a locally administered project (LAP).

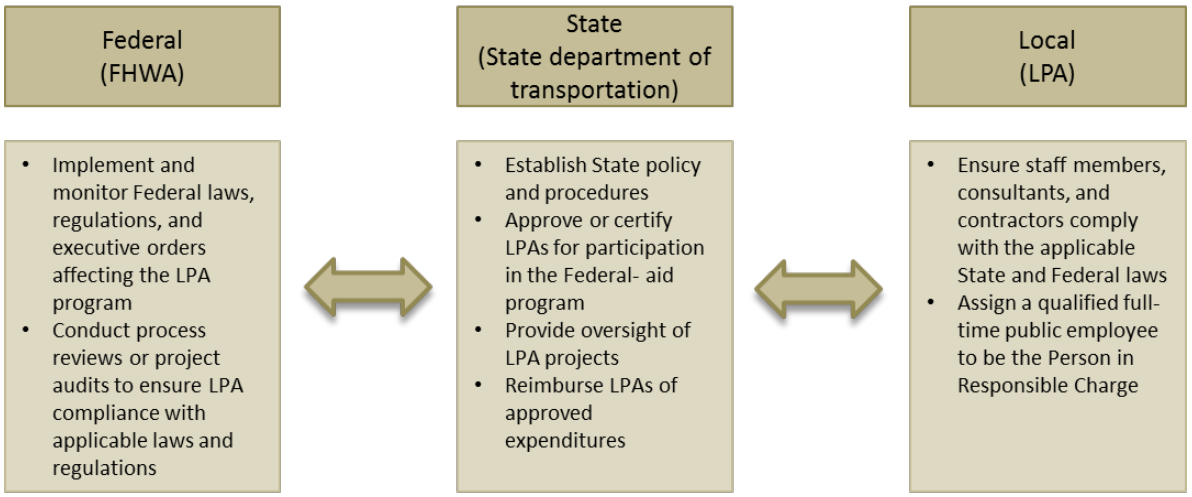


Figure 1. Illustration. Delegation of responsibilities on LPA projects.

The Intermodal Surface Transportation Efficiency Act of 1991; the Transportation Equity Act for the 21st Century of 1998; and the Safe, Accountable Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) of 2005 establish the respective roles and responsibilities of the Federal Highway Administration (FHWA) and State transportation departments in providing stewardship of Federal-Aid Highway Program activities under Title 23, United States Code, and other associated laws. (See references 7, 8, 9, and 1.)

An LPA, viewed in Federal regulations as a sub-recipient of Federal funds, must demonstrate to the State transportation department that it has adequate project delivery systems and sufficient accounting controls to properly manage Federal funds. Once approved or certified by the State transportation department to administer Federal-aid projects, an LPA may assume various project responsibilities, including the following:

- Project selection.
- Location and design.
- Utility and railroad agreements.
- Standard consulting engineering agreements.
- Environmental documentation.
- Plans, specifications, and estimates.
- Advertisement, award, and execution of construction contracts.

- Construction administration.
- Construction quality assurance (QA), including material testing and testing personnel.

In particular, Section 1904 of SAFETEA-LU revised §106 of Title 23 of the U.S.C. to broaden the States' oversight responsibilities and requires that sub-recipients of Federal-aid funds have adequate project delivery systems for projects approved under this section. This section also requires that the FHWA periodically review the monitoring of sub-recipients by the States.[9]

PROCESS REVIEWS

National reviews of LPAs conducted by FHWA in 2006 and the Office of Inspector General (OIG) from November 2009 through April 2011 revealed shortcomings not only in the efforts of LPAs to properly administer Federal-aid projects, but also in the role and effectiveness of oversight activities performed by the FHWA Division Offices and the State transportation departments to ensure LPA compliance with Federal requirements. Some of the general weaknesses identified in these audits are summarized in table 1.

Table 1. Weaknesses found in LPA program.

FHWA Oversight	State Transportation Department Oversight	LPA Administration
• No uniformity in how FHWA Division Offices assess the adequacy of State transportation department oversight programs • Failure of assessments of State transportation departments to be based on objective criteria and to emphasize compliance with Federal requirements • Failure to enforce corrective action plans to improve State transportation department oversight of LPAs	• No consistency in State LPA oversight activities • Lack of resources to perform State oversight of LPAs • Lack of State construction inspections of LPA projects on non-State routes	• Inadequate contract administration and QA procedures • Noncompliance with Federal requirements • Variable design and construction quality • Lack of documentation related to materials testing, construction inspection, and tester certifications • Limited knowledge of materials sampling frequency and testing needs

Such findings were based on only a limited number of LPA projects sampled in a handful of States. Nevertheless, the extent of noncompliance suggests the likelihood of similar deficiencies occurring in LAPs constructed nationwide. Because current estimates indicate that approximately 20 percent of the Federal-aid program is invested in LPA-led infrastructure projects, the potential for mismanagement and waste is not trivial in scale.

One primary area of concern is oversight of construction quality. The report states, "The team found that design and construction quality was highly variable, and the quality and availability of records made it difficult to verify compliance. It was also determined that material testing was often either not done or was undocumented leaving project quality and durability questionable."[2]

These reviews indicate that construction QA practices on many locally administered Federal-aid projects are in need of improvement. However, before improvements can be made, a more detailed understanding of the problem is needed from both the State transportation department and LPA perspectives.

23 CFR 637

All Federal-aid projects on the National Highway System (NHS)—including those administered by LPAs—are subject to the QA procedures in 23 CFR 637, Subpart B—Quality Assurance Procedures for Construction, promulgated by FHWA for projects using Federal-aid funds 23 CFR 637.[1] In 23 CFR Part 470—Highway Systems, NHS projects, are defined as follows:[10]

> [I]nterconnected urban and rural principal arterials and highways (including toll facilities) which serve major population centers, international border crossings, ports, airports, public transportation facilities, other intermodal transportation facilities and other major travel destinations; meet national defense requirements; and serve interstate and interregional travel. All routes on the interstate system are a part of the National Highway System.

For projects off the NHS, generally described as local roads or rural minor collectors, the established procedures approved by the State transportation department can be used for material acceptance as long as they satisfy the intent of the Federal requirements (23 CFR 637, subpart B).

In accordance with 23 CFR 637, a comprehensive construction QA program should consist of the following core elements: quality control (QC), acceptance, independent assurance (IA), dispute resolution, personnel qualification, and laboratory accreditation/qualification, which can be defined as follows:

- QC is process control testing conducted by the contractor to adjust production or construction work as necessary to control quality.

- Acceptance is the process of deciding whether to accept or reject a product or accept at adjusted payment. When contractor test results are used in the acceptance decision (as is often the case in current statistically based QA pavement specifications), this process should include inspection, contractor testing, agency verification, and possible dispute resolution. The agency's acceptance program should contain a reasonable level of visual inspection to ensure quality and workmanship meets the specified requirements. Testing, while important, may not reveal all workmanship problems.

- IA is unbiased testing performed to ensure that sampling and testing activities are being performed by qualified personnel using proper procedures and properly functioning and calibrated equipment. The objective of IA is to assure the reliability of all data used in the agency's acceptance decision—including both the agency's verification test results and the contractor's QC testing (if included in the acceptance decision). The results of IA tests should not be used as a basis of product acceptance.

- For QA programs permitting the use of contractor test results in the acceptance decision, an agreed upon Dispute Resolution procedure is used to resolve conflicts resulting from discrepancies between contractor and agency test results.

- Test data used in the agency's acceptance decision must be obtained using testers and laboratories having the appropriate qualifications and accreditations (23 CFR 637, Subpart B).[1]

Although many of the features and elements required under 23 CFR 637 have been incorporated into current State transportation department acceptance plans, QA procedures and acceptance plans still vary considerably among State transportation departments. Furthermore, the sub-recipients of Federal-aid funds–affiliated LPAs—vary to an even greater extent in terms of how quality management is implemented, the level of QA expertise within the LPA, adequacy of documentation, and the level of oversight from the State transportation department. This extreme variability underscores inherent problems in the consistent implementation and compliance with QA procedures in use today. More recent legislation under SAFETEA-LU broadened the responsibilities of State transportation departments to provide adequate oversight of LPA project delivery as the sub-recipients of Federal funds.[9] The legislation also requires that FHWA periodically review and monitor this State oversight. The challenge for FHWA will be to improve both the consistency of State transportation department oversight of QA procedures and develop practical QA procedures for LPAs that account for the various types, sizes, and scopes of LPA projects receiving Federal-aid funding.

With this understanding of the QA requirements for LPA projects and the reported shortcomings as the baseline, this study was needed to not only document the extent of the problem and specific areas needing improvement, but also to identify any existing best practices suggested by State transportation departments and LPA practitioners that could resolve the current shortcomings.

OBJECTIVES

This research had the following general objectives:

- Document current QA practices used on locally administered Federal-aid projects from State transportation department and LPA perspectives, including material sampling and testing, as well as inspection practices.

- Identify specific issues or areas of weakness in QA practices from both the State transportation department and LPA perspectives.

- Identify existing successful practices that could be applied to generally improve construction QA across the full spectrum of LAPs.

The scope of the study covered various types, sizes, and scopes of transportation projects delivered by LPAs, focusing on the construction and closeout phases.

RESEARCH APPROACH

This study involved the collection of existing documentation and research, and the analysis of survey and interview data from various State transportation departments and LPAs. The information was collected through a comprehensive review of existing literature, process reviews, and procedural documentation; a national survey of both State transportation departments and LPA organizations; and targeted telephone and onsite interviews with a select number of State transportation departments and LPAs that represented a diverse cross-section of organizational programs and geographic locations.

Literature Review

The literature review consisted of review and content analysis of national process reviews conducted by FHWA in 2006 and subsequent FHWA Project Management Improvement Team (PMIT) reviews and audits conducted by the State transportation departments either alone or jointly with the FHWA Division Offices. The literature review documented all the existing or ongoing research addressing QA for LPA projects and consisted of a content analysis of LPA guidance documents.

Survey

The survey instruments were designed for both State transportation department and LPA respondents. The research team solicited members of both the American Association of State Highway and Transportation Officials (AASHTO) Subcommittee for Materials and Construction for the State transportation department contacts. For the LPA contacts, the research team drew from an existing database of LPA contacts from previous research and from State transportation department referrals. The surveys were designed and implemented as an online tool requiring minimum effort on the agencies' part to ensure an adequate response rate.

The State transportation department survey included questions concerning the State transportation department organizational structure and oversight of LPA programs. Similarly, the LPA survey included questions addressing the LPA construction program size, Federal-aid project types, use of in-house versus consultant staff for QA, and the existence of internal QA guidelines. Both the State transportation department and LPA questions asked respondents to identify the levels of oversight or construction QA (i.e., levels of inspection and testing) applied to various project types. The surveys also ask respondents to rate the frequency of occurrence and severity of impacts related to various QA issues identified in the phase 1 content analysis. Lastly, the surveys ask respondents to identify practices that have been successfully applied to mitigate QA issues for LPA projects. The questions were designed to allow the team to determine trends or correlations in the data, and rank or prioritize issues according to their frequency and potential impact. The survey questionnaires for the State transportation department and the LPA respondents can be found in appendices A and B.

Interviews

The goals of the interviews were to (1) validate the results of the survey round and (2) gather detailed information and insight into the likely causes of issues or noncompliance, and best practices that can be used to resolve these issues. The interviews allowed the team to obtain more

complete, indepth responses to the survey questions, validate the initial survey results with particular emphasis on identification of issues and weaknesses in QA procedures for LPA projects, and identify successful QA for LPA practices that optimize or mitigate weaknesses. As in the case of the surveys, the questions were designed for both State transportation department and LPA staff to allow the team to determine trends or correlations in the data, and rank or prioritize issues according to their frequency and potential impact.

Based on the initial literature reviews and survey results and feedback from the technical panel, the team targeted the following States (including State transportation departments and LPAs suggested by State transportation department staff) for interviews that included the items listed in table 2.

Table 2. State transportation departments selected for interviews.

State Transportation Departments	Criteria
• California • Florida • Georgia • Ohio • Missouri • New Hampshire • Virginia • Washington • Wisconsin	• State transportation department location (geographical spread). • Differences in approaches to QA oversight of the LPA projects (i.e., use of consultant versus State transportation department staff for QA oversight). • Best practices related to QA for LPA. • LPA guidance manuals. • Structured approach to material QA for LPA and acceptance based on project types and risk factors. • Availability of previous internal QA process reviews or audits (addressing noncompliance issues and how they were resolved through the implementation of best practices).

The interview forms for State transportation department and LPA interviewees are provided in appendices C and D.

Evaluation of Data

Based on the content analysis of data collected in the literature review and the survey and interview results, the team aggregated the data and evaluated it, keeping in mind the key components of a QA program that meet the requirements for 23 CFR 637. In addition, the team identified how issues and best practices may differ based on size and makeup of the LPAs, and the types, sizes, and scopes of the projects being administered by these LPAs. The team also looked for trends, common themes, and characteristics that emerged from synthesizing the data. The team used, as appropriate, a variety of ways to portray the information in a user-friendly format, including tables, bar charts, and figures.

Based on the results of this synthesis of the information and data, the team first identified and classified key risk issues and differences in the perceived significance of the issues from the State transportation department and LPA perspectives. After identifying the issues related to LPA QA practices, the team then classified and ranked these in terms of their respective frequency of occurrence and consequences of issues.

Based on the content analysis of documents collected in the literature review and the survey and interview results, the team identified and similarly classified best practices from both the State transportation department and LPA perspectives. The team then prioritized these successful practices in terms of their perceived benefit (or positive impact) on either the State transportation department or LPA using a similar evaluation approach to that described above, and lastly aligned issues with successful practices that can potentially mitigate or address the issues identified. In essence, this step serves as the mitigation step in a risk assessment process.

Final Recommendations

The final recommendations also suggested which party would be in a position to implement the best practice to manage or address the issue. Ideally, most of the issues can be addressed at the LPA (project) level or at the State level. Others may require action by the FHWA Division office or Headquarters. This consideration will inform the best practices identified by the research and any future research needs.

CHAPTER 2. FINDINGS

This chapter presents findings from the team's extensive review of the literature and the survey conducted by the project team of State transportation department and LPA staff. The literature review included FHWA and State transportation department process reviews, prior research related to LPAs, current LPA guidance manuals, and FHWA/State transportation department stewardship agreements. Both State transportation department and LPA staff were surveyed to capture the different perspectives regarding QA for LAPs.

LITERATURE REVIEW

Also noted in the introduction, national reviews of LAPs conducted by FHWA in 2006 and the OIG from November 2009 through April 2011 revealed significant shortcomings in the efforts of LPAs to properly administer Federal-aid projects and in the role and effectiveness of oversight activities performed by the FHWA Division Offices and the State transportation departments to ensure LPA compliance with Federal requirements.

To gain further insight into possible areas of weakness in how LPAs conduct QA and in how State transportation departments oversee these LPA activities, the team conducted a comprehensive literature review. The primary resources consulted included the following:

- Process reviews and audits performed by FHWA Division Offices and State transportation departments since the 2006 FHWA national review.
- PMIT database.
- Past and ongoing research related to LPAs conducted at the State and national level.
- LPA guidance manuals published by State transportation departments.
- FHWA/State transportation department Stewardship and Oversight (S&O) agreements.

Process Reviews and Audits

To capture any changes or improvements made to LPA programs as a result of the 2006 National LPA Review, the team contacted various FHWA Division Offices and State transportation departments to identify and collect process reviews and audits of LPA programs performed between 2006 and 2012. Particular emphasis was placed on obtaining reports that addressed construction, inspection, and/or materials QA on federally funded LPA projects.

The team reviewed the reports to identify general trends in QA practices, as well as possible issues to investigate and agencies to explore further in phase II. Appendix E summarizes in a tabular form those reports that were identified as relevant to this research.

As suggested by the summaries provided in appendix E, the level of detail in the reports related to the topic of QA varied, but a number of reports were flagged for follow-up in phase II of the project. For example, the FHWA Florida Division report on construction oversight of off-State

highway system (SHS) LPA projects contains some particularly telling statistics presented in figure 2 regarding the inconsistency or variability in the level of QA activities being conducted by LPAs in Florida.[11]

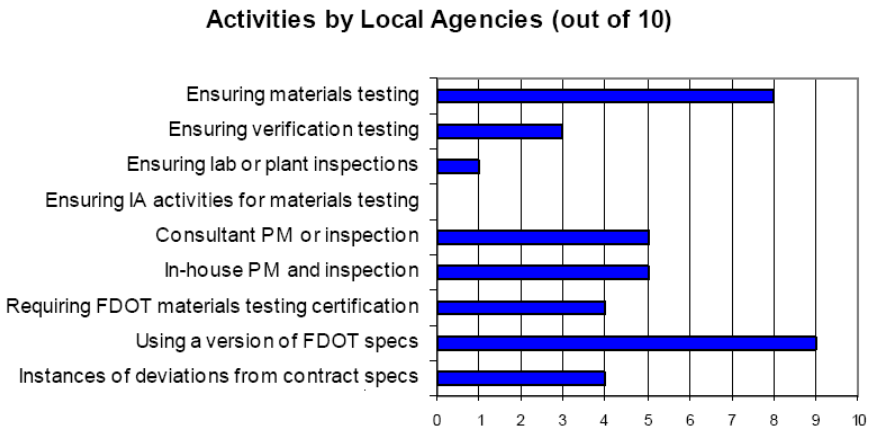


Figure 2. Bar Graph. Summary of interviews with 10 local agencies in Florida (from the 2008 LAP IIIB Review Report).[11]

Such trends were also observed in a number of other reviews conducted across the Nation. In May 2007, the California Department of Transportation (Caltrans), jointly with the FHWA California Division Office, conducted a QA process review of five local agencies: City of Redlands, County of Los Angeles, County of Solano, County of San Joaquin, and County of Sacramento.[12] The findings of this review were published in September 2007 and noted that "in general, the sampling, testing, and IA efforts on local agency projects need improvement." Specific observations included the following:

- Five of five LPAs reviewed were not keeping IA staff and laboratory/equipment separate from regular day-to-day acceptance testing.
- Four of five LPAs reviewed were not keeping project files updated and available for review at one central location.
- Five of five LPAs reviewed were not keeping log summary testing frequency information available upon request.
- Two of five LPAs reviewed were not keeping certifications readily available.

More recently, Caltrans has also been conducting and publishing quarterly reviews of LPA-led American Reinvestment and Recovery Act (ARRA) projects.[13] As of March 15, 2011, approximately 880 local agency ARRA projects were authorized in California, 95 percent of which received either joint or Caltrans reviews. In the report published for the fourth quarter of 2011, "frequency of sampling/testing deficient" and "sampler's/tester's certifications incomplete" were included among the top 10 observed deficiencies. Other identified noncompliance items related to construction QA included the following:

- Failure to maintain records of testing equipment calibration.
- Incomplete information on material certificates of compliance.
- Failure to document resolution of failing material acceptance tests.

The general conclusions drawn from all review reports can be summarized into the following six broad categories:

- **Documentation.** The level of field documentation varies, and it is not clear to State transportation department district personnel and/or LPAs what is required for inspection documentation. Often, backup documentation is not sufficient.

- **Training**. The trend found in many of the FHWA process review reports is that State transportation department district personnel and many LPAs are either not attending or are unaware of training that is available through their State on construction QA practices. In some cases, it was reported that LPAs cannot afford to attend training (particularly for becoming materials testing certified) or do not have the right personnel to become trained.

- **Guidance manuals**. Several State transportation departments do not maintain adequate guidance to assist LPAs with QA inspection and testing. Some State transportation departments simply direct the LPAs to follow the State transportation department construction manual, which is often too intensive for noncomplex LPA projects, or irrelevant to the type of specialized construction being performed. Guidance for State transportation department staff related to the State transportation department's S&O responsibilities is also lacking or could be improved.

- **Oversight by State transportation departments**. The level of oversight varies by region or district in each State, due in part to insufficient staff dedicated to the LPA program or insufficient guidance to regions/districts on the amount of emphasis to place on LPA projects. The quality and frequency of inspection on LPA projects varies considerably from once (at final inspection and/or acceptance) to multiple times (e.g., Oregon Department of Transportation (Oregon DOT)).

- **Quality assurance by local agencies**. The qualifications of LPA inspection staff (or consultants) may not be sufficient, particularly with regard to being materials certified. Most LPAs do not have dedicated materials or construction staff and therefore must rely on a State transportation department or private laboratory. Even so, some LPAs do not have a thorough understanding of materials and the benefits and challenges of material and QA testing.

- **Specifications**. Most LPAs use the specifications and standards developed by their State transportation department and thus do not necessarily understand the intricacies behind the specifications or why materials QA and IA are important and required.

Program Review Reports in FHWA PMIT Database

Reviews conducted by the FHWA PMIT team that were related in some manner to the subject of LPAs or QA were downloaded from the FHWA PMIT database. There were 53 observations and

recommendations from the PMIT team that related to the research topic. The key issues found are reported, along with their frequency of occurrence, in table 3. The most widespread issue concerned deficiencies in the project files, under the broader topic of contract administration, particularly related to Buy America provisions.

Table 3. Summary of key issues found in the FHWA PMIT audits.

Issue Identified Through Audit	Frequency of Occurrence (of 53 observations) (percent)
Contract administration or file deficiencies (especially Buy America)	20
Lack of, or not following, QA procedures or specifications	16
Qualified/certified materials testing personnel not documented	16
Materials certification (improper or lacking)	14
Lack of (or insufficient) sampling frequency	14
Insufficient inspection frequency, number of inspections, or inspection detail	13
Acceptance of failed materials	5
QC/QA not done on Force Account projects	1

The PMIT audits also observed three instances of good practices, as summarized in table 4, which generally related to the proper application of construction QA procedures.

Table 4. Good practices as noted in the FHWA PMIT audits

Good Practice as Identified Through Audit	State
Review of several projects indicated that proper testing and payment of materials are performed by LPAs. For example, some failing compressive strength tests on one city project resulted in the appropriate execution of penalties. The LPA also properly assessed liquidated damages when the contractor did not complete the work in the allotted number of calendar days.	Missouri
Use of construction checklists by State transportation department district personnel helps to better focus project oversight.	Multiple
One LPA developed its version of a contract management system, similar to AASHTO's SiteManager™, using a wireless network and based on Microsoft® Visual Studio with the specific module entitled Architectural/Civil Inspections. The system allows the inspector to enter pay quantity items in the field on a daily basis. The system is also capable of providing weekly summaries of each pay item incorporated into the project based on the daily reports and generating a monthly pay estimate.	Virginia

FHWA Every Day Counts 2 Locally Administered Federal-Aid Projects

To aid LPAs in addressing the complexities of the Federal-aid project delivery, a three-pronged strategy was implemented under FHWA Every Day Counts (EDC) 2.[(4)] This included stakeholder partnering, certification program, and the use of consultant services flexibilities as follows:

- **Certification/qualification programs.** These programs mitigate the potential for noncompliance by having State transportation agencies develop certification/ qualification type programs, which ensure that the LPA is certified and qualified to manage project activities, including QA for LPA projects. The available tools include the FHWA Federal-Aid Essentials for LPAs, which includes a module addressing QA practices.

- **Consultant services.** State transportation departments and LPAs often use consultants to manage, develop, and deliver the locally administered Federal-aid program and projects. To use consultant services for local programs and projects, the State transportation departments may assist in the following ways:
    - Prequalifying consultants to facilitate LPAs contracting for services, including for QA activities (testing and inspection).
    - Procuring and contract with consultants to provide QA services to be managed by LPAs.
    - Procuring, managing, and administering consultant services to develop and deliver projects on behalf of or at the direction of the LPA.
    - Contracting with oversight consultants to assist in managing monitoring and administering its local program.
- **Stakeholder Partnering Committee.** Communication of Federal-aid requirements is critical to the success of the LPA programs. To aid in this partnering effort and collaboration goal, a stakeholder committee composed of FHWA, State, and LPA representatives can be established to promote better understanding of Federal-aid requirements and improve the LPA project development and delivery processes.

The FHWA EDC 2 Web site includes additional information on benefits of these current LPA practices and current status of their use. It also provides additional resources and tools for LPA projects, including FHWA Essentials for LPAs, and an FHWA LPA Web site.[4]

FHWA has now transitioned to its EDC 3 program. Of the three initiatives, stakeholder partnering continues into EDC 3. This initiative focuses on forming stakeholder committees that include representatives from STAs, LPAs, and FHWA. The purpose of the committee is to improve communication by serving as a platform to launch training and process improvements in Federal-aid project delivery. Stakeholder partnering has the following benefits:

- Facilitates problem solving by creating a collaborative environment.
- Increases program integrity and compliance with Federal and State requirements.
- Provides more efficient use of State and local staff resources.
- Promotes ownership and timely project delivery at the local level.
- Increases cost effectiveness of project delivery.

Existing Research

Recent National Cooperative Highway Research Program (NCHRP) Synthesis Reports 414 and 442

A few items highlighted in the 2011 NCHRP Synthesis Report 414, *Effective Delivery of Small-Scale Federal-Aid Projects*, and the 2013 NCHRP Synthesis Report 442*, Practices and Performance Measures for Local Public Agency Federally Funded Highway Projects*, were relevant to this research project as follows:[14,15]

- **Distinction between projects on and off the right-of-way (ROW) of the NHS**. Some flexibility in contract administration and procurement options exists for small-scale Federal-aid projects, but not all State transportation department and LPA staff are aware of this flexibility. In some cases, the State transportation departments are aware of regulatory nuances but do not apply them on a widespread basis to avoid adding complexity to the regulatory process. In these cases, Federal regulations are applied to the full extent across the board without making distinctions between the application of Federal regulations on "off-system" projects and the application of regulations on those projects that are within the ROW of Federal-aid routes. The common reason offered by 10 States was that the potential confusion generated by making the distinction would outweigh the benefits of any off-system streamlining measures. However, some State transportation departments, such as in Virginia, and the FHWA have indicated that application of program requirements and associated flexibilities can result in significant time savings for project delivery.

- **Florida**. The use of a construction checklist for LPAs is considered a streamlining practice by the Florida Department of Transportation (FDOT). One effort to improve FDOT administration of the LPAs during construction was to hire general engineering consultants (GEC) to assist in performing inspections, coordinating environmental and permitting activities, and performing design reviews. In many cases, the district construction offices (in collaboration with LPA administrators) randomly select projects on local routes on which to perform quality assurance reviews (QAR). LPA quality assurance programs (QAP) are initially assessed by FDOT during the certification process; however, FDOT follows up with QARs to ensure that LPAs are following their own LPA specifications for construction and materials testing. This approach was reported as an effective practice because the LPAs are not required to follow the intensive FDOT testing requirements designed for large complex jobs thus reducing project costs by not requiring use of FDOT-certified laboratories and technicians.

- **Minnesota**. The Minnesota Department of Transportation (Mn/DOT) requires one process for materials QA for both Mn/DOT projects and LPA projects. An official from FHWA in Minnesota indicated that this is an effective practice because it ensures one consistent process instead of evaluating the effectiveness of several different local processes for materials QA.

- **Ohio**. Ohio Department of Transportation (ODOT) provides QARs of LPA projects through its district offices. ODOT indicated that the QARs result in recommendations to improve the program and are implemented by LPAs. Findings are included immediately via updates to the LPA manual and issuance of new guidance.

- **Virginia**. Virginia Department of Transportation (VDOT) implemented a form of project management that is a score-based risk and oversight method. The method is designed to assist VDOT project coordinators to identify any potential elements that could affect the level of risk to a LPA project, as well as to determine the VDOT's expected level of oversight. Elements reported to affect project delivery included funding level, experience level of the LPA, project category defined by VDOT, and project maintenance. Each element is assigned relative weights of importance. A weighted sum of values for each

project element is used to determine the risk factor. This risk factor is used to identify whether VDOT should apply a low or high level of oversight on the particular LPA project.[16] The VDOT process to determine a weighted risk factor and level of oversight taken from VDOT's current LAP manual is shown in appendix F.

- **Washington**. At the Washington State Department of Transportation (WSDOT), final inspection of LPA projects is done by regional local projects engineering staff. Consultants are not used by WSDOT to do LPA final inspections because these inspections are considered part of compliance. The WSDOT local program office stated that deciding how detailed the inspection should be depends on the performance history of the LPA completing the project. For example, certified agencies (CA) with a good performance record may not require more than "windshield" inspection because they have demonstrated high-quality work and compliance with design standards previously. This process is also consistent with the shifting of additional delegation of risk to CAs because WSDOT does not review CA design plans. However, project-level QA is done by WSDOT on mostly Americans with Disabilities Act (ADA) projects and pavement jobs, or other work types that WSDOT has determined to be more high risk. For example, all ADA projects get detailed inspections by WSDOT to match grade requirements.

  IA reviews are done both at the WSDOT headquarters level and at the regional WSDOT level, for the purpose of compliance assurance and for identification of systematic training needs. Training needs identified are handled through local technical assistance program (LTAP) newsletters or WSDOT-sponsored training for LPAs.[17]

WSDOT also developed a conceptual materials risk analysis process in which typical construction materials were examined for the risk of having a material fail to meet specification and the consequences of that material failing to meet a given specification.[17] The result of the study was the development of a risk ranking system for either more or less intensive examination by WSDOT. The following four categories and associated actions were developed:

- **Highest risk materials**. Must undergo physical acceptance testing or are inspected during fabrication under a manufacturer's quality system plan.
- **Moderate risk materials.** Accept through the manufacturer's certification of compliance (often combined with a quality systems plan or visual inspection).
- **Lower risk materials**. Accept with a manufacturer's certification or with a catalog cut.
- **Lowest risk materials**. Accept through visual inspection in the field.

WSDOT now has a system in place to formally evaluate the risk of materials (failure to meet specification and the consequences of those failures) and to determine the level of assurance needed to accept each construction material. WSDOT is now working on establishing an electronic management system to track the actual performance of a wider variety of materials over the course of their lifecycles.

FHWA Local Agency Review

Construction practices in a handful of local agencies in Florida were reviewed in detail in 2007 by the FHWA Florida Division Office. Some of the better practices employed were summarized and include the following:[14]

- DeSoto County includes a QC plan and verification/assurance procedures in its contracts for geotechnical materials testing included in any LPA projects.

- In Volusia County, county inspectors are trained using FDOT State Materials Office courses for field testing. County project engineers "pop-in" to inspect consultant testing laboratories in accordance with open-access agreements set up as part of the laboratory contract. They also watch consultant personnel while they are running materials tests to review the process.

- Bay County adopted standardization for LPA construction projects by using FDOT's official form for inspections. In addition, the county pre-video each of the LPA project locations and retain a large number of photos for each project.

- The City of Lakeland Department of Public Works produces a complete contract file for each LPA project that contains before/after project photos and both as-planned and as-built aerial photos.

- Collier County keeps detailed daily inspection reports on standardized documents, along with a complete photo log that chronicles construction at the site from the beginning to the end of each federally funded project.

NCHRP Synthesis Topic 43-04 (2012) Practices and Performance Measures for Local Public Agency Federally Funded Highway Projects

A few items highlighted in the 2012 NCHRP Synthesis Project 43-04 were relevant to this research project.[18] The findings presented below came from the raw data responses to either the State transportation department or the LPA survey.

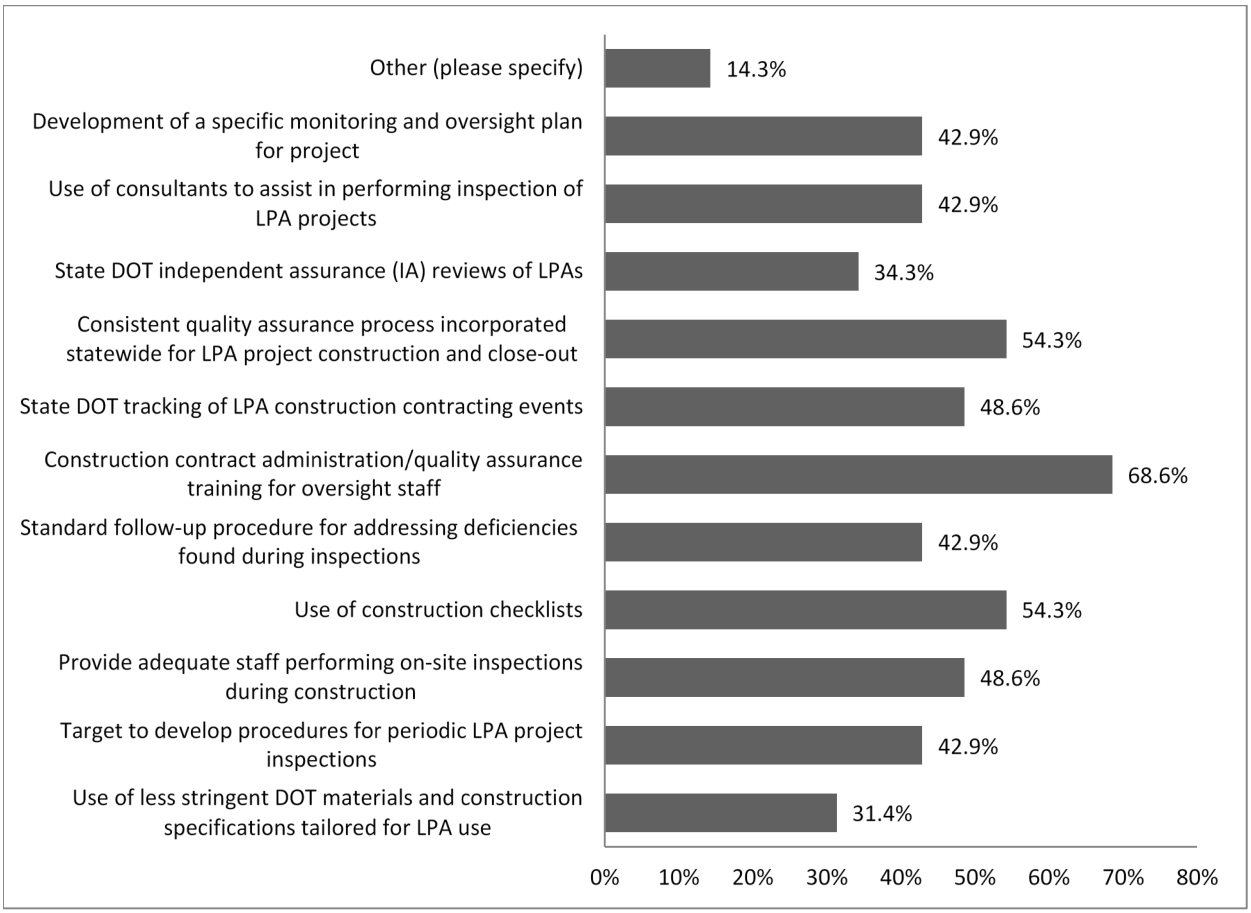
State Transportation Department Survey:

- Only 11 percent of State transportation departments reported that they include QA as a topic in their training courses for LPAs. This statistic confirms the general trend observed from the large number of FHWA program review reports regarding LPA training.

- When asked what types of Federal-aid funding its State transportation department receives for LPA projects, 95 percent reported Surface Transportation Program funds, 74 percent reported funding for Roadway Improvement Projects (widening, overlays, etc.), and 87 percent reported funding for Bridge Projects. These are all funding types that would require materials QA, construction inspection, and likely IA.

- When asked how its State transportation department could improve LPA oversight during construction, the activities shown in figure 3 were reported.

- When asked to identify specific project phases in which the certification of LPAs has improved project delivery, the area with the highest response rate (74 percent) was the construction contracting and inspection phase. This finding corresponds to comments found in numerous FHWA process review reports regarding the correlation between LPA project experience level and increased quality of projects constructed.



Source: L. McCarthy

Figure 3. Bar Graph. Summary of responses from State transportation departments related to improving LPA oversight during construction (from NCHRP Synthesis 43-04, 2012).[18]

LPA Survey:

- When asked to list some innovative practices that the LPA has developed, or was using to overcome project delivery hurdles, 11 of 41 LPAs reported the use of their own LPA materials or construction specifications, or an abbreviated State transportation department specification provided for LPAs.

- Table 5 summarizes the responses received from LPAs when asked how their agency improves project oversight during construction. It is anticipated that the LPAs that represent these responses may be contacted in phase II of this project for interviews. It

should be noted that a number of the LPAs who reported these activities came from the State of Oregon, where the Oregon DOT has been suggested as engaging in a number of successful practices with regard to the LPA program.

Table 5. Summary of responses from LPAs related to improving LPA oversight during construction (from NCHRP Synthesis 43-04, 2012).[18]

Activity Reported	Number of Respondents
Application of QA to all federally funded projects	26 of 40
Consistent procedure for periodic inspections of your federally funded projects	29 of 40
Use of construction checklists	26 of 40
Standard follow-up procedure for addressing deficiencies found during inspections	22 of 40
Formal tracking of construction contracting events (e.g., subcontracts, materials certification test results, etc.), with updates to the State transportation department	28 of 40
Use of consultants to assist in more frequent inspection of your projects	22 of 40

Evaluation of the Wisconsin Department of Transportation Local Program Management Consultant Program

In 2006, in response to a number of shortcomings cited by FHWA regarding the Wisconsin Department of Transportation's (WisDOT) management of its local program (e.g., inadequate staffing and resources, lack of proper inspection, poor QC, inconsistency in State oversight, deficiencies in documentation, etc.), WisDOT began to use management consultants (MC) to manage its Federal-Aid Local Program statewide.

Under the MC program model, WisDOT delegates direct project oversight on LPA projects to an MC, who reports to a WisDOT Regional Project Manager. The MCs provide reviews and spot-checks for preliminary design, environmental documentation, final design, and construction management. FHWA treats MC oversight as WisDOT oversight.

A February 2012 evaluation of the effectiveness of the MC program over the 6-year history of its statewide implementation revealed the following[19]:

- All interviews and documents reviewed indicated that local program compliance had improved significantly since implementation of the MC program.

- The MC program seems to provide a solution to the problem of keeping LPAs in compliance with FHWA regulations and has not been shown to appreciably increase costs.

- The feeling is that MCs bring additional focus and commitment to the local program (because they are able to dedicate more time to local projects than WisDOT staff, who likely have multiple responsibilities in addition to the local program management), capture costs more accurately, provide easier access to skills and expertise, and handle changes in workload more effectively than WisDOT could.

- Concerns regarding the use of MCs include the potential for conflicts of interest, loss of expertise and experience for WisDOT personnel, limitation of career advancement opportunities for WisDOT personnel, and potential loss of influence and stature for WisDOT by contracting out for these services.

AASHTO 2013 Subcommittee on Construction LPA Oversight Survey Results

The AASHTO Subcommittee on Construction conducted a survey in 2013 addressing State transportation department oversight of local agency construction projects. One question addressed State transportation department oversight of LPA project phases. Regarding the construction administration phase, the majority of State transportation departments performed construction administration (70 percent); however, some reported that under certain conditions, certified LPAs share or take on more of the responsibility for construction oversight. The following are examples of the responses[(20)]:

- **Colorado.** In accordance with CFR 23, the Colorado Department of Transportation (CDOT) is responsible for oversight of all project phases. However, LPAs can significantly advance a significant portion of the work required for each phase, thus "overseeing" phases of the work. CDOT is currently developing a risk-based approach to formally assign degree of oversight by phase.

- **Washington.** The LPAs operating under a certified acceptance agreement are responsible for ensuring that their projects meet Federal and State requirements, and the State completes compliance reviews on a sampling basis and reviews specific documents and milestones. For projects being delivered by LPAs not under a certified acceptance agreement, the regional staff determines specific milestones and steps requiring State concurrence or approval.

- **Oregon.** If the LPA is certified through Oregon DOT's Certification Program, it has an opportunity to oversee the phases for which it is certified. If the LPA is non-certified, Oregon DOT oversees all phases.

In a corollary question, AASHTO asked what entity (i.e., State transportation department, LPA, or consultants) typically performs construction administration and materials QA. The responses indicated that in some cases, the State transportation department or the LPA performs QA, but the majority of respondents (70 percent) indicated that consultants were used in all phases of a project, including construction inspection services.

- **Idaho.** The Idaho Department of Transportation (IDT) recently started allowing the LPAs to handle the utility relocations and ROW acquisition according to their own process. The LPAs are aware that they must follow the CFR for Federal reimbursement. In the case of the Local Highway Technical Assistance Council, they often hire consultants to assist with construction administration. Ada County Highway District is the only other LPA that performs construction administration on its projects. IDT administers construction on all other LPA projects.

- **Wisconsin.** WisDOT uses MCs. An MC is a private firm that is under contract with WisDOT to manage the delivery of the Local Program. MCs work directly with the LPAs

and report to the Local Program project managers in each Region office. The MC has a dual role of enforcement of Federal and State requirements, as well as assisting LPAs with project design and construction issues. The MCs are an extension of the WisDOT staff. They have been delegated review and/or approval authority for certain project actions.

- **Mississippi.** The LPA is responsible for the project but typically hires a consultant to develop and oversee the construction of the project. If National Environmental Policy Act compliance requires an Environmental Impact Statement, the Mississippi Department of Transportation (MDOT) takes it over; otherwise, the LPA keeps it. MDOT is available to do the testing for the LPA depending on the quantity and the availability of MDOT staff. There are some tests that MDOT must do.

In a follow-up question AASHTO asked whether State transportation departments have implemented certification, training, experience, or licensing requirements for LPAs and their consultants. The responses indicated that fewer than half of the responding agencies had certification requirements. Also certification could refer to general LPA qualification or certifications to perform specific functions (i.e., asphalt testing). Examples include the following:

- **Idaho.** Most of the time, the consultants are selected from a pre-qualified list, where they have been qualified to do different categories of work. There are no certification requirements for the LPAs.

- **Arkansas.** The State transportation department does not have any certification requirements or other risk assessment tools for LPAs. For consultant contracts, consultants must be licensed to practice in the State. During the consultant selection process, certifications, years of applicable service, specific training, and other issues are considered.

- **Washington.** WSDOT Highways and Local Programs Division has certification requirements for agencies to operate under certified acceptance. Agencies that are not certified can still administer Federal-aid projects with additional oversight by the State or another certified acceptance agency.

- **North Carolina.** The North Carolina Department of Transportation (NCDOT) does not currently require LPA certification for Federal or State projects. NCDOT anticipates that some form of prequalification or certification for LPAs may be required in the future. Consulting firms providing services must be prequalified by NCDOT to provide services. This prequalification process includes licenses, certifications (if applicable), work experience, references, and safety.

- **Virginia.** VDOT has a certification process that may provide certain municipalities with greater autonomy (with minimal VDOT project oversight) and a more streamlined approval process than the typical LPA administering a Federal-aid project. The process to become certified is very rigorous and, to date, only one locality has received the certification.

Guidance Manuals

Thirty-nine State transportation departments maintain Web sites related to their LPA assistance programs. The team accessed each of these Web sites and collected any guidance manuals and procedural information related to construction administration and QA activities.

Because several of the findings reported in the process reviews summarized in appendix G revealed shortcomings in the guidance provided to LPAs, the team performed a content analysis of the guidance manuals.

A review of the manuals collected, as summarized in appendix H, revealed extreme differences in the breadth and depth of information provided to assist the LPAs. Several State transportation departments focus primarily on preconstruction issues such as project selection, utility and railroad coordination, and ROW acquisition, with very little guidance related to construction administration and QA.

Other State transportation departments have made a considerable effort to provide guidance on how to perform materials testing and construction inspection and document the results. For example, the Maine Department of Transportation (MaineDOT) publishes a manual and reference guide on both construction administration and construction documentation that provide LPAs with an overview of the construction oversight and documentation processes that they must follow to ensure work is performed according to the contract plans and specifications and Federal and State requirements. In addition to such guidance, the MaineDOT Materials Section also prepares Minimum Testing Requirements to specify the frequencies and types of tests that are to be done on materials used on a specific project.

Similarly, in its Quality Assurance Program (QAP) Manual for Use by Local Agencies, Caltrans defines the required elements of a QAP, addressing both acceptance and IA. Instruction is provided on maintaining acceptance testing records and materials documentation and on developing an IA program (if not requesting Caltrans to provide IA services). Acceptance sampling and testing frequency tables for various materials and project elements are also provided. Details regarding the FHWA/Caltrans process review program are provided as well, alerting LPAs to the types of questions and information sought during these audits.[(21)]

New Hampshire Department of Transportation (NHDOT) also publishes a separate sampling and testing program guide for LPA-managed Federal-aid projects, requiring such agencies to develop a specific QAP for each project. The LPAs are required to define in their QAPs the quantity of each item in the project that requires sampling and testing; the number of acceptance tests required; an anticipated schedule for testing; the name and contact information for the party conducting the acceptance tests; and the sources of materials, including production plants for ready mix concrete, hot mix asphalt (HMA), precast concrete, and structural steel. Frequency of Sampling and Testing tables are provided for soils, asphalt items, concrete items, and structural steel. For materials not included in these tables, the LPA may base acceptance on the producer's certification that the material meets the appropriate NHDOT specification or inclusion of the material on the NHDOT Qualified Products List (QPL) and submittal of a Certificate of Compliance.

Georgia Department of Transportation (GDOT), in its *Local Government Administered Project Manual*, perhaps comes the closest to strictly adhering to, and touching upon, the elements required of a QA program under 23 CFR 637.[1] LPAs are repeatedly reminded to perform QA in accordance with the CFR and GDOT's *Sampling, Testing and Inspection Manual*, and to ensure that testing is completed by laboratories accredited through the AASHTO Accreditation Program, using testers certified by GDOT. The certified technicians that perform sampling and testing on the project must also submit to GDOT's IA program.[22]

Stewardship and Oversight Agreements

A review was conducted to assess the content of current FHWA/State transportation department S&O agreements. Each State's S&O agreement is meant to set the pace for the Federal-aid program, similar to a "contract" in spelling out expectations and responsibilities.

The purpose of this review was to identify the extent to which QA of the LPA program, construction oversight, and materials QA are being addressed in the overarching agreement between a given FHWA Division and its State transportation department. Sections of the agreements that could be related to LPA-administered projects were assigned a rating (good, limited, and vague) in terms of their specificity and emphasis on materials QA and construction oversight. Appendix I summarizes the results of a review of 13 FHWA/State transportation department S&O agreements.

SURVEY FINDINGS

Surveys were developed and distributed to all State transportation departments, and responses were returned by 34 States and the District of Columbia. A similar survey was distributed to LPAs, in some cases from names suggested by the respondents to the State transportation department survey, and 33 agencies from 14 different States across the Nation provided responses. Maps of the States in which responses were provided by the State transportation department and LPA surveys and interviews are presented in figure 4.

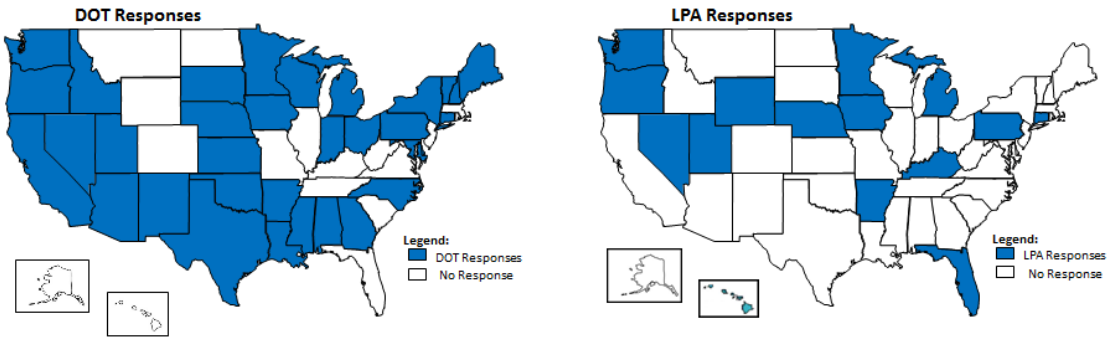


Figure 4. Map. Geographical distribution of survey responses by agencies.

Given the distinct roles and responsibilities assumed by State transportation department and LPA representatives in the delivery of a LAP, separate surveys were developed so that questions could be tailored as necessary to align with the State transportation department and LPA perspectives.

For example, whereas the State transportation department survey primarily focused on the State transportation department's oversight of LPA programs, the LPA survey addressed the LPA's construction program size, Federal-aid project types, use of in-house versus consultant staff for QA, and the existence of internal QA guidelines. Both surveys asked respondents to identify the levels of construction QA (i.e., levels of inspection, testing) and oversight (in the case of the State transportation departments) applied to various project types. In addition, surveys asked respondents to identify practices that have been successfully applied to mitigate QA issues. Preliminary results from these surveys are summarized in the following subsection.

State Transportation Department Survey

To capture multiple perspectives within the State transportation department, email invitations were sent to State LPA coordinators as well as to construction and materials engineers. Survey distribution and response statistics are as follows:

- One hundred eighty-four individuals were invited to participate in the survey.
- Forty-eight responses, of varying degrees of completeness (i.e., some respondents did not answer all questions), were received.
- Of these 48 responses, 34 unique States were represented (i.e., multiple individuals from Nevada, Delaware, Georgia, New York State, New Mexico, Oregon, and Utah responded to the survey).
- The responses provided a fairly balanced cross-section of opinions, with responses received from 17 LPA coordinators, 16 materials engineers, and 14 construction engineers.

Results from key survey questions are summarized in the following subsections and documented in appendix G with comments. Unless otherwise noted, when multiple surveys were received from a single State transportation department, a composite answer was generated to reflect the collective response of the State transportation department. Raw State transportation department survey results in Microsoft® Excel have also been provided separately in appendix G.

The survey results were analyzed to identify any discernible trends regarding program size, project types, and training and oversight resources, particularly in terms of challenges and best practices associated with materials and construction QA. Findings of this analysis include the following:

Organizational Structure/Certification

- Of the State transportation departments that responded to the survey, 94 percent have a formal LPA program, managed mostly by a combination of Central Office and District Office State transportation department staff.
- Twenty-two of the States that participated in the survey also have an LPA certification process. Sixty-eight percent of these State transportation departments consider the QA capabilities or past QA program performance as part of the decision to certify an LPA,

and 26 percent consider these items as part of the decision to award Federal funds to an LPA project.

- With regard to whether or not a State transportation department has a certification process for LPAs, inconsistencies in the responses from individuals within the same State transportation department, coupled with multiple "I don't know" responses, suggests that LPA "certification" remains a fairly new concept, particularly to those in materials and construction. Interview participants attributed this result in part to the relative newness of certification programs promoted by FHWA EDC 2 and the fact that these programs place primary emphasis on project planning, development, and administrative functions rather than on an LPA's construction QA capabilities.

- It is also of interest to note that of the 22 States that have an LPA certification process, only 2 of those States consist principally of a municipally owned public highway system as opposed to a county-owned system.[23]

Training

Training was identified in past process reviews as a best practice. Of 48 responses, 28 State transportation departments indicated that specific training was provided to their staff (or consultants) on how to oversee the construction QA performed on LPA projects. Twenty- two State transportation departments indicated that training is provided to LPA staff on how to implement the QA standards for Federal-aid projects.

State Transportation Department Oversight of LPAs

The primary means that State transportation departments use to assure that LPAs are complying with QA standards and specifications range from onsite field inspections to project reviews or audits by the State transportation department and/or FHWA, which were included in 28 and 29 responses, respectively (of 48 responses). In comparison, verification testing was cited in only 16 responses and was more commonly attributed to State transportation departments that engage consultants to assist with the LPA oversight process.

Oversight Staff: The people performing inspections on LPA projects vary by State transportation department, but in many States, they are a mixture of consultant and State transportation department Central Office or District Office staff. In States with relatively small local programs, such as Delaware and Oklahoma, the State transportation department staff generally directly administers the construction phase of projects on behalf of the LPAs. In such States, the risk profile of LPA projects is therefore the same as for the State transportation department projects.

QA Oversight Procedures: In response to being asked what QA procedures State transportation departments maintain or what activities they conducted to oversee LPAs, the majority of the State transportation departments responding cited reviews/audits, maintenance of QPLs, and lists of accredited laboratories and qualified testers. For example, LPAs must select materials from the State transportation department QPL or master list of qualified or accredited laboratories, or use approved sources (e.g., quarries) as noted in figure 5.

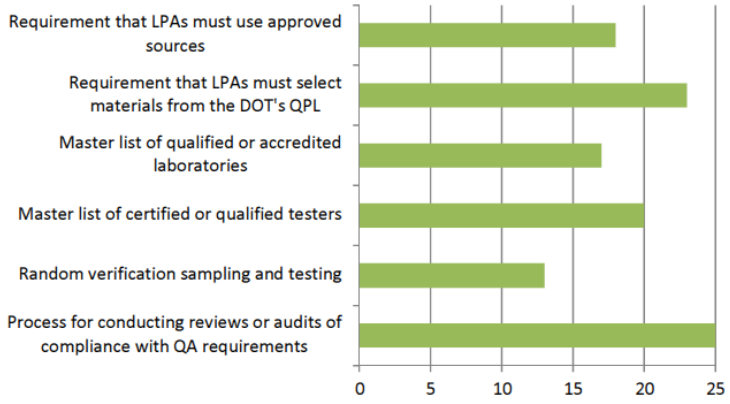


Figure 5. Bar Graph. Summary of QA oversight practices.

However, where State transportation departments certify LPAs, these certified LPAs may develop their own QA procedures. The procedures the State transportation department would undertake would vary depending on the LPA-approved program specifics. Twenty State transportation departments (of 48 responding) indicated that they allowed LPAs to use their own specifications or standards for materials and construction QA. Several respondents further clarified in the comments section to the survey that the State transportation department would need to first review and approve LPA-generated specifications or QA programs.

Nearly half of the departments of transportation account for compliance with QA standards in the overall estimated cost of an LPA project. When compliance is not met, the LPAs often must find the additional funds to complete the necessary testing to comply with QA standards.

Specifications: In 30 percent of the States that responded, the LPAs are permitted to use their own specifications or standards (with prior State transportation department review and approval) for activities related to materials and construction QA. Twenty State transportation departments (of 48 responding) indicated that they allowed LPAs to use their own specifications or standards for materials and construction QA. Several respondents further clarified in the comments section to the survey that the State transportation department would need to first review and approve LPA-generated specifications or QA programs.

Independent Assurance: In more than half of the responses, the State transportation department's IA program covers LPA testers and equipment on federally funded LPA projects, and in States where it is not routinely covered, the State transportation departments provide assistance when possible. The approach by the responding State transportation departments to IA was split equally between a system-based and a project-based approach on LPA projects.

Twenty-four of 31 State transportation departments indicated that their IA program covered the LPA's testers and equipment. Conversely, 8 of 33 State transportation departments indicated that LPAs could develop their own IA program (either by choice or if the State transportation department did not extend its IA program to the LPA). However, as noted in some survey comments and as further clarified during interview discussions, complying with Federal IA requirements for LPA projects is recognized as a challenge, particularly for smaller LPAs.

For example, in New Hampshire, the system-based IA and QA approach includes acceptance testing for the federally funded LPA projects that is similar to the State transportation department projects because the same testing consultants are doing both levels of projects. The difference between the State transportation department and LPA projects is that the IA includes fewer material quantities for LPA projects.

Sampling and Testing Schedules: In 57 percent of the States, the State transportation department prepares the materials sampling and testing schedule for LPA-administered Federal-aid projects or requires that the LPA must use the State transportation department's minimum sampling and testing guide, which indicates the testing frequencies.

Eighteen State transportation departments (of 26 respondents) indicated that they prepared the materials sampling and testing scheduled for LPA-administered projects. However, of the eight State transportation departments that indicated that they did not prepare the sampling and testing schedule for the LPA, three further clarified that they reviewed and approved the LPA-generated schedule.

Inspection Level of Effort: The State transportation departments were queried about what their level of effort was for the inspection of materials and construction on federally funded LPA projects. For a routine or periodic inspection during construction, State transportation departments were more likely to perform a cursory field inspection, whereas at final inspection, a more detailed field inspection/acceptance was more common (based on 27 responses) and they can be seen in figure 6.

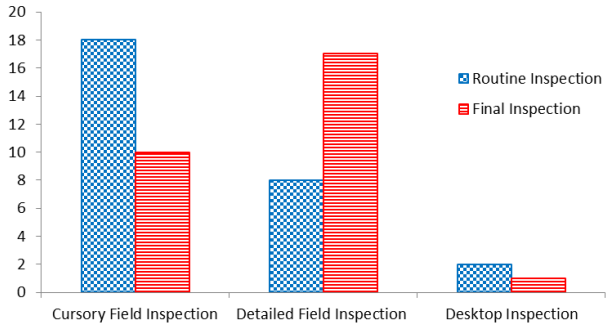


Figure 6. Bar Graph. Routine inspection versus final inspection.

Also, State transportation departments were more likely to conduct detailed field inspection on an LPA project located on the NHS than one that was located off the NHS (based on 27 responses) as seen in figure 7.

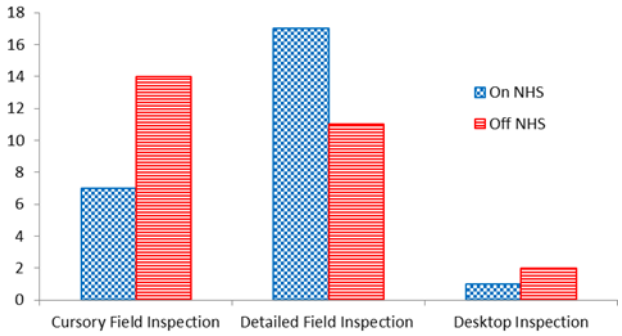


Figure 7. Bar Graph. Level of inspection for on- versus off-NHS (SHS).

In general, the survey results (based on 31 responses) indicated that the State transportation departments are primarily performing cursory inspections on trail and streetscape projects, while reserving more detailed field inspections for earthwork, pavements, and bridges or structural elements as seen in figure 8.

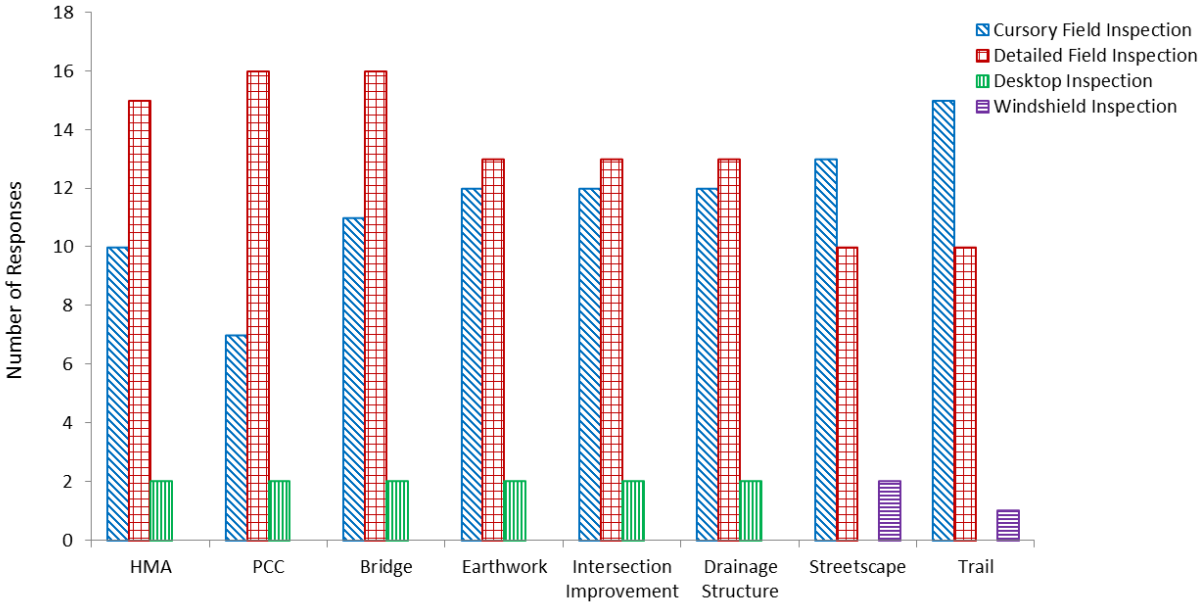


Figure 8. Bar Graph. Inspection effort based on project type.

Weaknesses in Construction QA

Frequency of QA-Related Issues: In response to how frequently issues regarding materials and construction QA occur on federally funded LPA projects, figure 9 shows that many of the responses stated that issues seldom occurred or only did so periodically. The issues with the highest frequency of occurrence, either regularly or periodically, were lack of QA documentation and insufficient materials sampling/inspection frequency or detail. This response was consistent with the general response received from the interviews of both State transportation departments and LPAs that there was not necessarily an issue with materials and construction quality, but more with the documentation and compliance with contract administrative elements of the construction, including QA documentation and procedures.

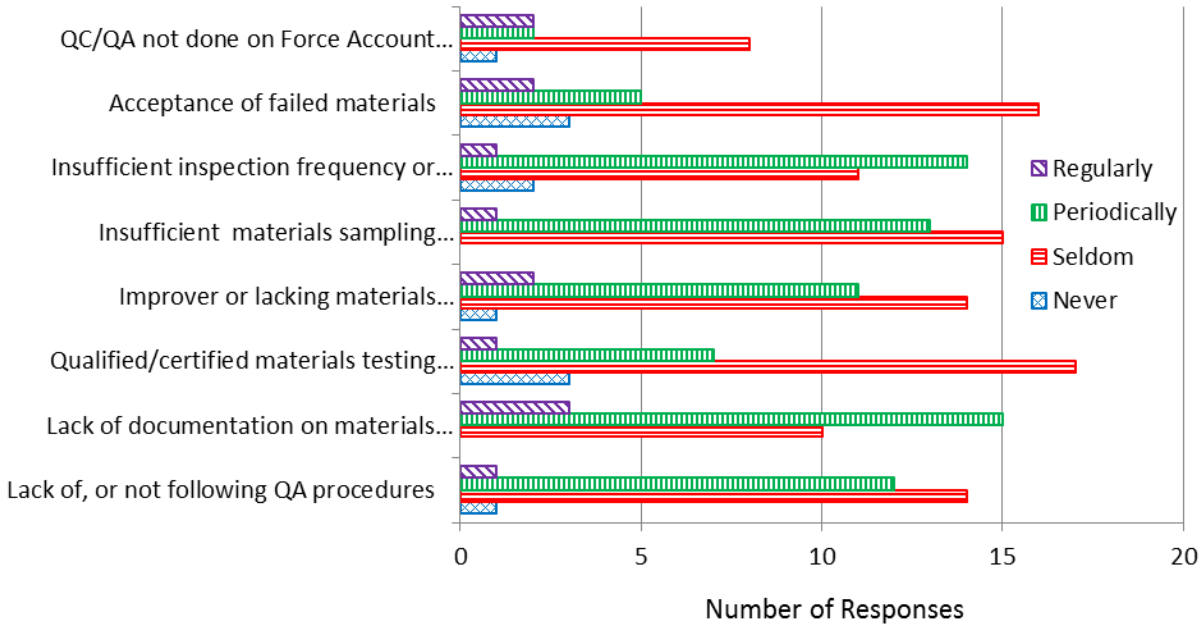


Figure 9. Bar Graph. Frequency of issues related to QA.

Perceived Significance of QA Issues: Figure 10 presents the relative significance of these issues reported by State transportation department staff. The issues were prioritized (top to bottom) based on the number of responses reporting a significant or moderate impact on QA. The results indicate that the most significant issues from the State transportation department perspective were lack of and/or not following QA procedures, acceptance of failed materials (also interpreted as simply failed materials), insufficient inspection frequency, and lack of QA documentation in the files. It should be noted from the responses that it was as likely that these issues had minor or minimal impacts on quality.

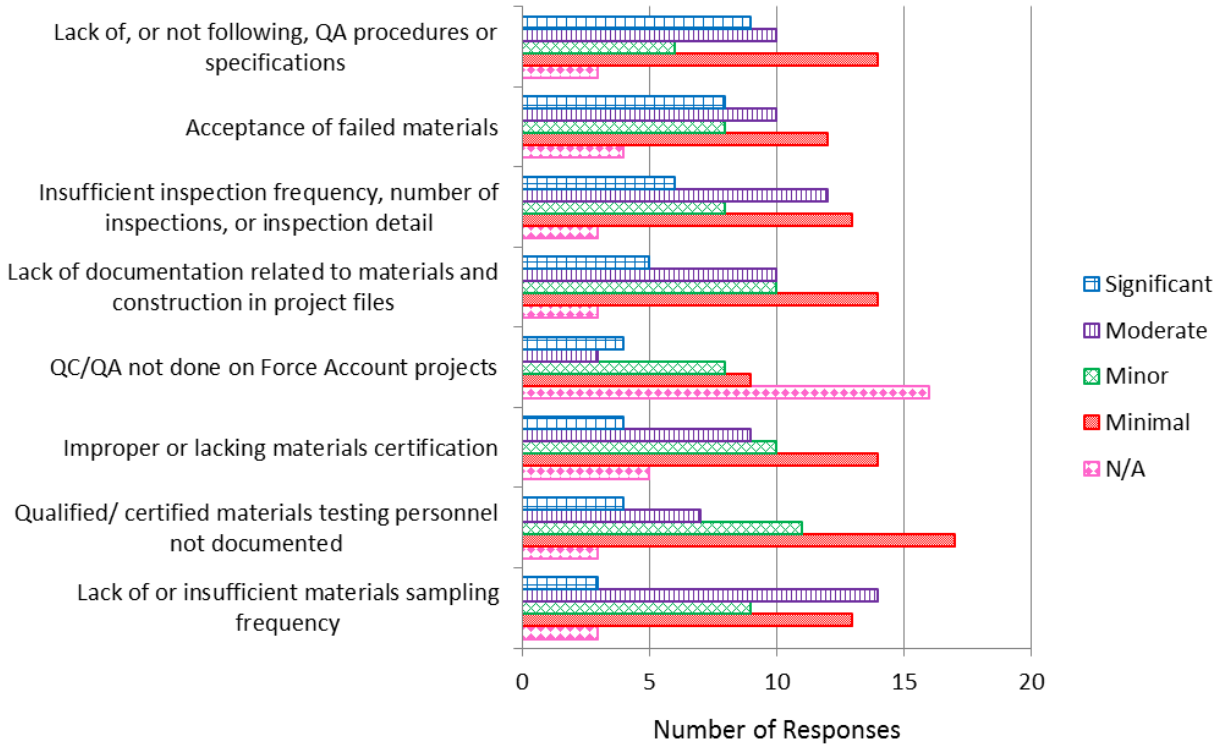


Figure 10. Bar Graph. Perceived impacts of issues from State transportation department perspective.

It was difficult to identify trends in the data for impacts because it appears that the responses to this question were driven in part by a respondent's role in the organization. Follow-up interviews were conducted with all State transportation departments that rated issues as having significant impacts to obtain more information on how the rating was assigned and the experiences in these States. During interviews, some State transportation department staff, particularly LPA coordinators, stated that the failure to provide required documentation was perceived as a significant impact and could result in loss of Federal funding. Conversely, construction and materials staff cited that not following QA procedures, insufficient testing and inspection, or acceptance of noncompliant materials were the most significant impacts and could also result in FHWA withholding Federal funds on an LPA project.

Best Practices (to Avoid or Mitigate Issues)

The last series of questions asked State transportation department respondents to identify any practices that have been used to improve or mitigate perceived challenges, and rate these practices in terms of their significance for mitigating challenges (e.g., minimal, moderate, or significant). These responses are grouped together and summarized in the following paragraphs.

Training and Certification of State Transportation Department Staff and Certification of LPAs: Training and certification of State transportation department staff and presumably certifying LPA staff for administration and QA oversight was viewed as a moderate to significant practice to mitigate challenges. A significant number of State transportation departments (8 of 22, or 36 percent) cited training and certification as important, particularly

when training was provided on an annual or periodic basis. Certification of an LPA (presumably for QA and other purposes) allows the State transportation department to shift administration of the project to the LPA staff or its consultants and reduce the level of State transportation department oversight.

Periodic Meetings and Communication: Conducting preconstruction conferences to explain QA requirements, periodic update meetings during construction, quarterly or annual reviews, and other forms of direct communication between the State transportation department and LPA staff to clarify requirements or changes were cited by several agencies (5 of 22, or 23 percent) as a practice that improves QA, expedites final acceptance, and ensures that administration of an LPA project meets Federal-aid requirements.

Providing the Same QA Oversight of LPAs as for State Transportation Department Projects: Some State transportation departments (4 of 22) reported that providing the same oversight of LPA projects as for State transportation department projects, using State transportation department specifications and QA procedures, was a best practice for QA of federally funded LPA projects. A closer examination of the State transportation departments providing this response revealed that these were departments most often in rural States or smaller programs administering LPAs with fewer resources.

Other: Additional best practices cited by one or more State transportation department included the following:

- Providing highly qualified and certified State transportation department staff for oversight.
- Providing LPA guides and specifications tailored to LPA projects.
- Using construction checklists.
- Using consultants to manage and administer LPA projects.

LPA Survey

The goals of the LPA survey were to identify the levels of construction QA (i.e., levels of inspection, testing) applied to various project types and to determine how the LPA coordinates with the State transportation department to ensure QA requirements are met.

For comparative purposes, questions were also posed to collect information on the LPAs' construction program size, typical Federal-aid project types, use of in-house versus consultant staff for QA, and the existence of internal QA guidelines.

Survey distribution and response statistics were as follows: The original distribution list included the contact information of 129 LPA representatives that had provided survey input on past research studies. Demonstrating the high level of turnover at LPAs, more than 20 percent of the email invitations immediately bounced back because the email addresses were inactive. Through the State transportation department surveys, an additional 47 LPA contacts were identified.

Thirty-four responses have been received from LPAs. In addition, several LPAs were interviewed in conjunction with State transportation department visits. According to the survey responses, surveys were received from LPAs located in Arkansas (1), Connecticut (1), Florida (10), Hawaii (1), Iowa (2), Kentucky (1), Michigan (1), Minnesota (4), Nebraska (2), Nevada (2), Pennsylvania (1), Oregon (4), Utah (2), Washington (1), and Wyoming (1).

Survey questions are summarized below and documented in appendix J with comments. Raw LPA survey results in Microsoft® Excel have also been submitted separately. Key findings that can be drawn from the LPA surveys received thus far are described in the following subsections.

Program Structure/Size

As seen in figure 11, 55 percent of LPAs surveyed had annual construction programs ranging from $1 to $10 million. At the extremes, 3 percent had programs of less than $100,000, and 12 percent reported having programs of more than $10 million. Sixty-six percent of respondents reported that 0 to 30 percent of their construction program was performed using Federal-aid funds. The remaining 34 percent reported that Federal funds comprised 30 to 60 percent or, in a few cases, less than 60 percent of their program.

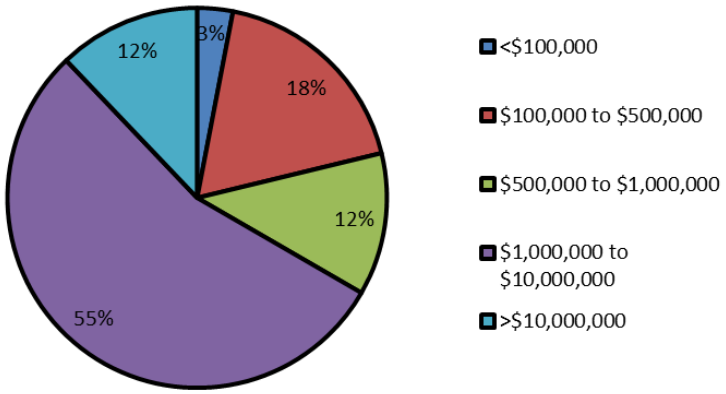


Figure 11. Pie Chart. Size of LPA programs in dollars.

The LPAs reported a wide range of project elements were included in their programs. These include pavements and bridges to intersections, drainage structures, streetscapes, and scenic trails. The majority of LPAs reported using Federal-aid funds for HMA paving projects and drainage structures. Figure 12 shows typical project elements reported by respondents.

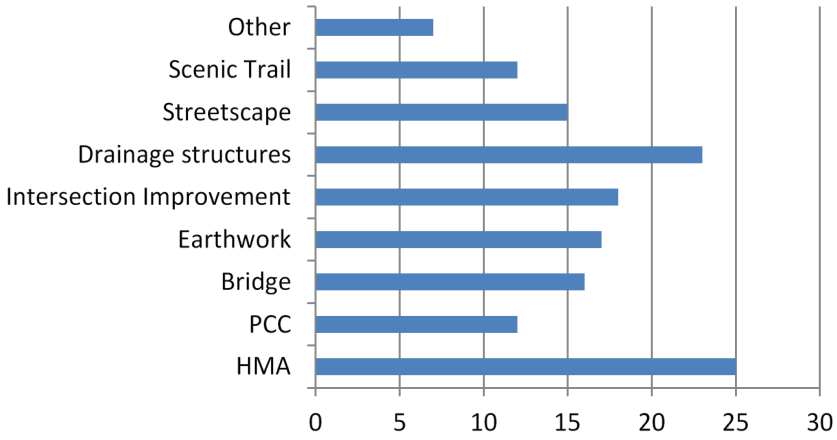


Figure 12. Bar Graph. Typical LPA project elements.

Cost of QA

In response to a question regarding the amount of project funds typically dedicated to QA, specifically for QA testing and construction inspection, the responses ranged from 5 to 30 percent, with an average of approximately 10.7 percent. One respondent reported 0 percent, which indicated that QA was performed by State transportation department staff outside the project budget. Most, however, indicated that QA was a component of the project funding and that QA costs were typically higher for federally funded projects. For example, one LPA respondent provided additional detail indicating that QA costs for town-funded projects were typically less than 10 percent of project costs, whereas QA costs for a federally funded project amounted to greater than 30 percent of project funds. Another LPA provided a breakdown of LPA construction engineering and inspection (CEI) costs (15 percent of contract value), contractor QC costs (3 to 5 percent of contract value), and LPA QA costs (25 percent of contractor QC costs or a one to four ratio for QA to QC testing. This indicated that the higher end of the range of reported percentages (i.e., 20 to 30 percent) represented the combination of all cost components, whereas the lower end (i.e., 3 to 7 percent) represented the activities related to testing and acceptance.

LPA QA Practices

The survey responses indicated that the LPAs rely heavily on consultants, with 23 agencies indicating that they retain consultants to perform QA activities. Most of the LPAs retain consultants and testing laboratories that are qualified or certified by the State transportation department. The responses indicate that LPAs seem to be applying the same level of QA (testing and inspection) regardless of project type (e.g., pavement or scenic trail). The LPAs also appear to rely heavily on State transportation department guidance and standards. Twenty-nine of 32 LPAs defer to the State standards to determine a project's sampling and testing needs. Fifteen LPAs indicated that they have received training from the State transportation department related to construction QA.

State Transportation Department Involvement in Construction QA

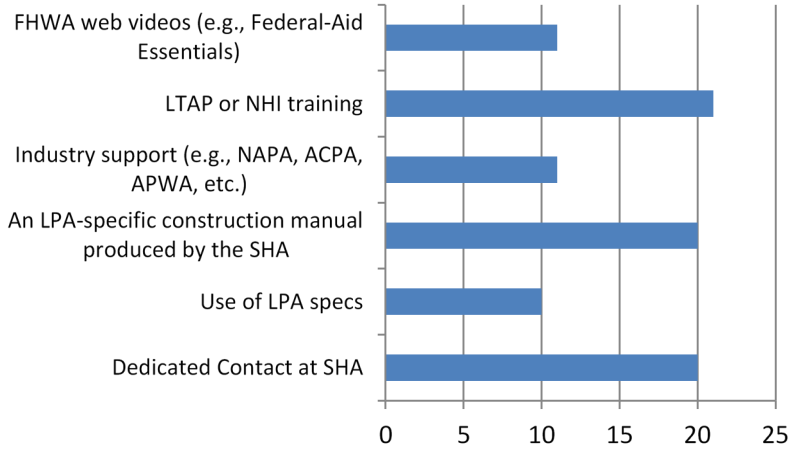
With regard to the level of department of transportation involvement in LPA project QA activities, the LPAs reported that State transportation departments are often involved in IA, final acceptance, verification testing, and inspection. For inspection, the survey results indicated that State transportation department staff may have moderate to major involvement; however, one of the respondents stated that the level of involvement of a State transportation department varies depending on the project type and whether the LPA is a certified agency. For example, an LPA county in Washington State indicated that it was a certified agency, qualified to administer its own projects, and the State transportation department role was minimal.

Level of Inspection and Testing

In response to questions asking for the relative levels of inspection and testing applied to different project types, generally higher levels of inspection and testing (i.e., daily testing or detailed field inspections) were applied to larger, more complex projects involving pavement or bridge rehabilitation, intersection improvements, or drainage structures. For smaller projects (i.e., scenic trails, or sidewalks), the levels of testing and inspection was somewhat reduced, but quite often, detailed field inspection was required for all project types, regardless of size or complexity.

Best Practices

With regard to what tools help ensure QA is being performed properly, the LPAs highlighted training, industry support, having a dedicated contact at the State transportation department, and LPA specifications and/or construction manuals tailored to LPA projects (i.e., a streamlined version of the State transportation department's construction manual). Figure 13 shows the responses.



NHI = National Highway Institute
NAPA = National Asphalt Pavement Association
ACPA = American Concrete Pavement Association

Figure 13. Bar Graph. Tools to assist LPAs with QA.

Interviews

The surveys discussed previously were drafted with the intention that the survey responses would provide the research team with initial insight into the following areas:

- Maturity of the State transportation departments local assistance programs and efforts (e.g., certification programs, training, and guidance).
- Profile of LPA program and project types.
- Level of involvement of State transportation department staff in QA.
- Issues and challenges with performing and overseeing construction QA on LPA projects.
- Best practices currently being applied to reduce or mitigate challenges related to LPA-administered Federal-aid projects.
- Respondents' interest in providing additional information to the team.

Building on the survey results, the purpose of the interviews was to elicit information about several aspects of the dynamics between the LPAs and State transportation departments that were not readily apparent from the survey results from both the State transportation department and LPA perspectives in the States interviewed. In particular, the goals of the interviews were to (1) collect general programmatic information from State transportation department and LPA staff regarding program size, project types, and current QA practices, (2) obtain more insight into both program deficiencies and best practices that could be used to resolve these issues, and (3) gather and develop detailed case studies to support these findings if possible.

Follow-up face-to-face interviews and teleconferences were conducted with the following State transportation departments and LPAs:

- **Florida**. On September 11 and 12, 2013, team members conducted face-to-face interviews with representatives from FDOT's districts 1, 5, and 7, as well as from the following LPAs: City of Ormond Beach, Volusia County, Hendry County, City of Lakeland, City of Tampa, and Hillsborough County.
- **Maine**. On October 17, 2013, team members conducted a face-to-face interview with representatives from MaineDOT and the local FHWA Division Office.
- **Missouri**. On December 5, 2013, team members conducted a teleconference with Missouri Department of Transportation local program staff.
- **New Hampshire**. On October 15 and 16, 2013, team members conducted face-to-face interviews with representatives from NHDOT, the local FHWA Division Office, the towns of Allenstown and Campton, and the City of Claremont, and visited the Campton project depicted in figure 14.

Source: Sidney Scott

Figure 14. Photo. Blair Covered Bridge Historic Reconstruction, Town of Campton, NH.

- **Ohio.** On August 27, 2013, team members conducted a teleconference with representatives from ODOT construction and local program staff.

- **Oregon.** On December 5, 2012, team members held a teleconference with Oregon DOT construction oversight staff.

- **Pennsylvania.** On November 15, 2012, team members held teleconferences with Pennsylvania Department of Transportation District 11 and Allegheny County LPA staff.

- **Washington.** Team members held a teleconference with the WSDOT local programs office on January 8, 2014.

- **Wisconsin.** Team members conducted teleconferences with WisDOT local agency programs staff on February 10, 2014, and followed up with teleconferences with the Waukesha County and Saulk County Engineering Manager.

- **Virginia.** Team members conducted face-to-face interviews with the VDOT local agency programs staff in the City of Richmond and Fairfax County on October 28, 2013.

- **Caltrans.** Team members conducted teleconferences with Caltrans local agency program staff from construction and IA on June 17, 2014.

The research team also attempted to schedule an interview with GDOT, but was not able to schedule interviews with the construction and local agency staff in time for the issuance of this report. The individual interview minutes, in appendix K, summarize challenges and best practices. The summaries below expand on the survey results and highlight the perspectives of both State transportation departments and LPAs from larger and smaller programs. The areas summarized below consist of general programmatic information concerning the agencies interviewed, oversight of QA for LPA projects, specific issues and weaknesses related to QA, and perceived best practices.

Programmatic Information

State Transportation Department Perspective: The interviews included State transportation departments with relatively large programs, a diverse number of LPAs, large and small, urban and rural, (California, Virginia, Florida, Washington, and Ohio), including counties, cities, and municipalities. The team also interviewed State transportation departments (New Hampshire, Maine, Wisconsin, Missouri, and Oregon) with smaller programs or with greater numbers of smaller, rural LPAs, and a State without a county system (New Hampshire). The larger State transportation department programs have the following characteristics:

- Tend to delegate greater responsibility to LPAs for QA administration depending on the capabilities of the LPAs.

- Assign dedicated department of transportation management staff to LPA programs, including construction and materials from headquarters or districts, and conduct periodic inspections or documentation audits of LPA projects to assure that LPA or consultant staff are in conformance with QA and other Federal-aid requirements.

- Maintain and provide certification and training programs (in conjunction with FHWA LPA guidance) to assist LPAs with meeting QA and other Federal-aid requirements.

- Use a tiered approach to QA oversight depending on LPA capabilities or certification standards obtained by the LPA.

- Develop and maintain LPA-specific manuals, specifications, and guidelines tailored to LPA projects. Larger LPAs may have their own construction inspection staff, LPA specifications, or construction/QA manuals, and the State transportation department allows use of LPA-specific specifications unless the project is critical or on the NHS or SHS.

The State transportation departments reported that even for the larger State programs, most LPA projects are less than $1 million and involve sidewalks, culverts, streetscapes, or small interchanges or bridge rehabilitation. Less frequently, LPAs have major projects, such as bridge or other signature projects, that require greater levels of funding, resources, and QA oversight.

For the State transportation departments with smaller programs or more rural LPAs, the State transportation department staffs typically are more directly involved in QA oversight for LPA projects, in some cases providing staff for periodic inspection, verification and acceptance testing, and IA. These State transportation departments typically require that LPAs essentially adhere to the same QA requirements as for State transportation department Federal-aid projects using the State transportation department standard specifications and QA manuals.

LPA Perspective: The local agencies interviewed included counties, cities, and towns. The LPAs ranged from small towns with minimal in-house staff that occasionally entered into a Federal-aid project as part of a Federal-aid improvement program (i.e., safety enhancement and accessibility, safe routes to school, urban construction, scenic trails, etc.) to large cities or county LPAs with significant capital construction programs, using LPA standard specifications, and employing in-house engineering and construction staff. For the purposes of this study, the

smaller LPAs can be defined as those with smaller construction programs and minimal in-house staff, whereas larger LPAs have significant construction programs, and in-house construction and engineering staff capable of managing construction. Most of the LPAs, large and small, use consultants at some level to perform CEI services and QA testing on LPA projects. Several LPAs reported that the level of effort for construction management was the same regardless of the type of Federal-aid project. The consultants used were quite often former State transportation department employees with the same qualifications/certifications to perform the inspection and testing as for State transportation department projects.

Certification/Qualification of LPAs

Similar to the survey results discussed above, some ambiguity regarding certification/ qualification programs was also evident during the interviews, revealing a need for further clarification and outreach on the possible benefits of such programs. The requirements for an LPA to become "certified" varied significantly among the State transportation departments interviewed. The interview discussions and a review of the previously collected literature suggest that a broad spectrum of certification/qualification processes are in use today, ranging from the LPA completing a simple self-assessment form or viewing training videos to the more rigorous, multistep interviews and partnering efforts to assign the LPA cradle-to-grave project responsibility. Because LPA certification/qualification is a key EDC initiative, an opportunity exists to standardize terminology and provide guidance on best practices related to LPA certification, particularly related to QA.

Issues and Challenges Related to QA

The interviewees, both State transportation department and LPA staff, were asked to comment on challenges or issues related to QA for LPA projects considering how often the issues arise and what the impacts might be. The interview forms included the issues that were generally identified in the FHWA and State transportation department process reviews. While acknowledging that issues were identified regarding insufficient QC testing and inspection being performed on LPA projects, both the State transportation departments and LPAs that were interviewed generally believed that there was a very low frequency of failing or noncompliant materials, and the greater challenge was with administrative paperwork and recordkeeping. Examples were missing test reports in the files, missing documents for closeout, and fewer tests taken or material certifications than required.

While the administrative paperwork issues related to QA on LPA projects generally did not result in significant or obvious direct quality impacts (i.e., failing materials, increased maintenance costs), it still could result in a significant cost or time impact or result in loss of Federal aid. One example, noted in figure 15 for a pedestrian bridge) resulted in additional costs to the State transportation department to hire a consultant to recertify the welds for the bridge, and a delay in closing out the project.

Figure 15. Photo. Keene Pedestrian Bridge, City of Keene, NH.

Other issues cited by the State transportation department interviewees included the following:

- Lack of consistency among State transportation department staff performing QA oversight.
- Lack of understanding by LPAs regarding QA testing and the levels of verification testing and documentation required for acceptance of the work.
- Less experienced or untrained consultant staff hired by LPAs that may not be qualified for certain discipline areas, and do not follow procedures or perform the right numbers of tests according to the State transportation department or LPA specification requirements.
- Lack of clear-cut guidance for State transportation department/LPA staff handling noncompliance issues (both in the LPA manuals and in the standard specifications).
- Not enough consistent communication among all the parties involved in a project, including LPA, State transportation department district oversight staff, and FHWA.

Most of those interviewed acknowledged that IA, whether performed by the State transportation department or the LPA, can be challenging. The State transportation departments with the least issues related to IA indicated that State transportation department staff retained full responsibility for IA testing. The interview discussions also revealed some confusion regarding the term "independent assurance" or IA testing. As used in the survey and interview questionnaire, the term was intended to refer to those activities performed to ensure qualified personnel are performing sampling and testing using proper procedures, and using properly functioning and calibrated equipment. Several interview participants initially responded to this subject thinking in terms of verification testing of contractor test results used in the acceptance decision.

A summary of LPA interviewee perspectives on challenges or issues related to QA for federally funded LPA projects included the following:

- The generally high cost of QA for federally funded LPA projects. Some LPAs perceive that they have limited control over these QA oversight costs. One example of the added costs related to compliance with QA and other Federal-aid requirements provided by an LPA was for a 2.5 mi ARRA paving project where half of the project used local funds and the other half included Federal funds. Although the two sections used the same

design, specifications, and contractor, the cost for the federally funded portion was 100-percent higher, in part owing to the required use of a consultant contract to provide management and oversight. Both State transportation department and LPAs reported that the use of consultants has, in some cases, added to the costs of CEI for LPA projects because of the consultant tendency to justify full-time staff or additional scope.

- Project closeout and paperwork for projects (i.e., justifying nonconformance reporting) takes much too long, which has cost consequences on future projects.

- State transportation department specifications or State transportation department LPA specifications are, in some cases, not fully applicable to certain projects, particularly city or town projects with different design- or construction-related standards. The city specifications are more than adequate for most types of city projects.

- Frequent updates of State transportation department specifications.

- Requirement for LPAs to use State transportation department laboratory information management systems software, which has increased administrative costs for data input and management.

- Inconsistent training or training not available, particularly related to QA inspection and testing requirements.

- Lack of consistency from State transportation department QA oversight and management staff related to differences among districts or State transportation department staff turnover.

- Difficulty with sorting out project funding and getting reimbursement for Federal-aid projects.

- Lack of flexibility with FHWA/State transportation department standards and requirements for Federal-aid LPA projects, regardless of type of project.

The LPAs generally agreed with the State transportation department interviewee perspective that the issues focused less on the quality of construction than the added administrative burden and cost related to complying with QA and other administrative paperwork requirements for Federal-aid LPA projects. The LPA perspective was different, however, in the sense that some LPAs felt that the additional QA-related soft costs, either for in-house staff, State transportation department, or consultant oversight, or for CEI, reduced the hard dollars allocated to construction and were not worth the additional investment. The LPAs generally did not offer quantifiable evidence to support their opinions regarding QA costs. It appeared that this perception of added burden and cost for Federal-aid also related to meeting other Federal requirements (i.e., Equal Employment Opportunity (EEO), Labor Compliance, Buy America). Some LPAs, particularly larger, well-capitalized local agencies with dedicated local funding sources, indicated that they do not use Federal funds on certain projects, particularly ones with complications, unless required or necessary.

Best Practices

Again, the interviewees, both State transportation department and LPA staff, were asked to comment on best practices to mitigate or address specific challenges related to QA for LPA projects. These best practices included the use of dedicated State transportation department staff for LPA projects, training for QA oversight, specifications tailored to LPA projects, use of consultants, standardized procedures for addressing deficiencies, checklists, and other practices.

One best practice consistently identified by State transportation departments and LPAs alike was regular face-to-face communication between State transportation department and LPA representatives. Several agencies, State transportation department and LPAs, pointed to greater or consistent use of project walkthroughs, and preconstruction or pre-paving meetings to define QA requirements, commitments and responsibilities, early action items, and milestones. It was also recommended that preconstruction meetings should be followed by periodic or quarterly coordination meetings to assess progress, raise issues, and develop solutions.

Training was also mentioned repeatedly as a best practice, but several representatives from both the State transportation departments and LPAs also noted that the high level of turnover at LPAs limits the effectiveness of periodic in-person training. One LPA suggested that the general training on LPA contract administration should be supplemented with more specific targeted training related to use of electronic systems and forms, and QA inspection and testing for specific project types or elements. Web-based training was suggested as an alternative or supplementary measure. The initial investment in online training could be costly but would save the cost of classroom training.

Most State transportation department interview respondents cited the development of specific LPA guidelines and manuals for administration of LPA projects as a best practice that has reduced the frequency of issues related to quality or noncompliance with QA. The initial analysis of these manuals, however, found that there were significant differences in the content and depth of the information, particularly related to construction administration and QA. The most effective manuals were those that included detailed guidance on construction QA and documentation requirements.

Several agencies noted that developing a risk-based or flexible approach to QA oversight based on the criticality of the project or the work or materials would provide a rational way to optimize State transportation department resources. VDOT is one agency that is currently attempting to refine and apply such a risk-based approach. One of the LPAs in Virginia, however, noted that applying different standards to different projects can create unnecessary complications in the field, with State transportation department inspectors often applying the same level of oversight to all projects.

The use of consultants was viewed as a best practice by some agencies but is controversial—not all the LPA respondents supported their use. A State transportation department implemented a relatively unique approach to the administration of LPA projects through its MC program. This program allowed the State transportation department to outsource the management of its LPA program by district without delegating its QA oversight responsibility. The State transportation department has independently evaluated the MC performance, and the findings were that

program has been cost effective (compared with use of State transportation department staff) and has resulted in a much higher level of compliance with QA and other Federal requirements.

A large LPA commented that this MC oversight was not consistently applied, was frustrating—allowing no flexibility in requirements based on the project type—and created potential conflicts of interest with consultants working under CEI contracts for the LPA. Also the MC primary client relationship was with the State transportation department even though the LPA was partially paying for the MC services. A smaller LPA with fewer resources working under the same MC program commented that the MC program worked well and improved QA compliance and compliance with other Federal requirements.

Additional best practices suggested by both the State transportation department and LPA respondents included the following:

- **LPA.** Creation of an LPA certification program that includes QA oversight qualification for construction such that LPAs can take on greater responsibility and control of QA compliance with Federal requirements.

- **State transportation department**. Post project evaluations and a log/database to document lessons-learned and share best practices and lessons learned.

- **State transportation department/LPA**. Promote consistent administration and oversight in a State program through LPA forums, a community of practice, or a stakeholder group.

- **State transportation department**. Annual partnering reviews with State department of transportation and LPAs.

- **LPA.** The use of more flexible QA standards and specifications for local projects.

- **State transportation department**. Development of a LPA consultant contracting and administration guide for use of consultants on LPA projects.

CHAPTER 3. EVALUATION OF FINDINGS

This chapter aggregates all sources of information, including literature (i.e., process reviews, regulations and guidance documents, prior research, and PMIT database), and survey results and interviews from State transportation departments and LPA staff. It prioritizes the results in terms of key issues and challenges, and how perspectives on issues and impacts may differ based on the source (State transportation departments versus LPAs). It also evaluates best practices or practices that mitigate QA challenges from the different perspectives (FHWA, State transportation department, and LPA), considering compliance with 23 CFR 637, differences in State transportation department and LPA capabilities, and varying project types.

STEWARDSHIP AND OVERSIGHT AGREEMENTS

A review of the content of several (13) current FHWA/State transportation department S&O agreements was performed to assess the extent to which QA of the LPA program, construction oversight, and materials QA are being addressed in the overarching agreement between a given FHWA Division and its State transportation department. Specifically, the integration of the LPA-administered projects in the portions with materials QA and construction oversight was assessed, and each document was assigned a Rating (Good, Limited, Vague). The details of the evaluation done of each of the S&O agreements reviewed are presented in appendix I. Information that pertained to materials QA and construction oversight and the LPA program was only included in about one-third of the S&O agreements. In general, most of the S&O agreements were vague or limited in terms of information specific to local agencies and lacked emphasis on materials QA and construction oversight.

QA ISSUES AND CHALLENGES REPORTED BY STATE TRANSPORTATION DEPARTMENTS AND LPAS

State Transportation Department Perspectives

State transportation department survey respondents were asked to qualitatively rate issues or challenges based on how often they occurred and what the perceived impacts were. These results are combined in figure 16 to illustrate the key issues (in upper right quadrant of the scatter plot) that are of most concern to State transportation department staff. The identified challenges were initially derived from the FHWA or State transportation department process reviews and carried forward in the surveys and interviews.

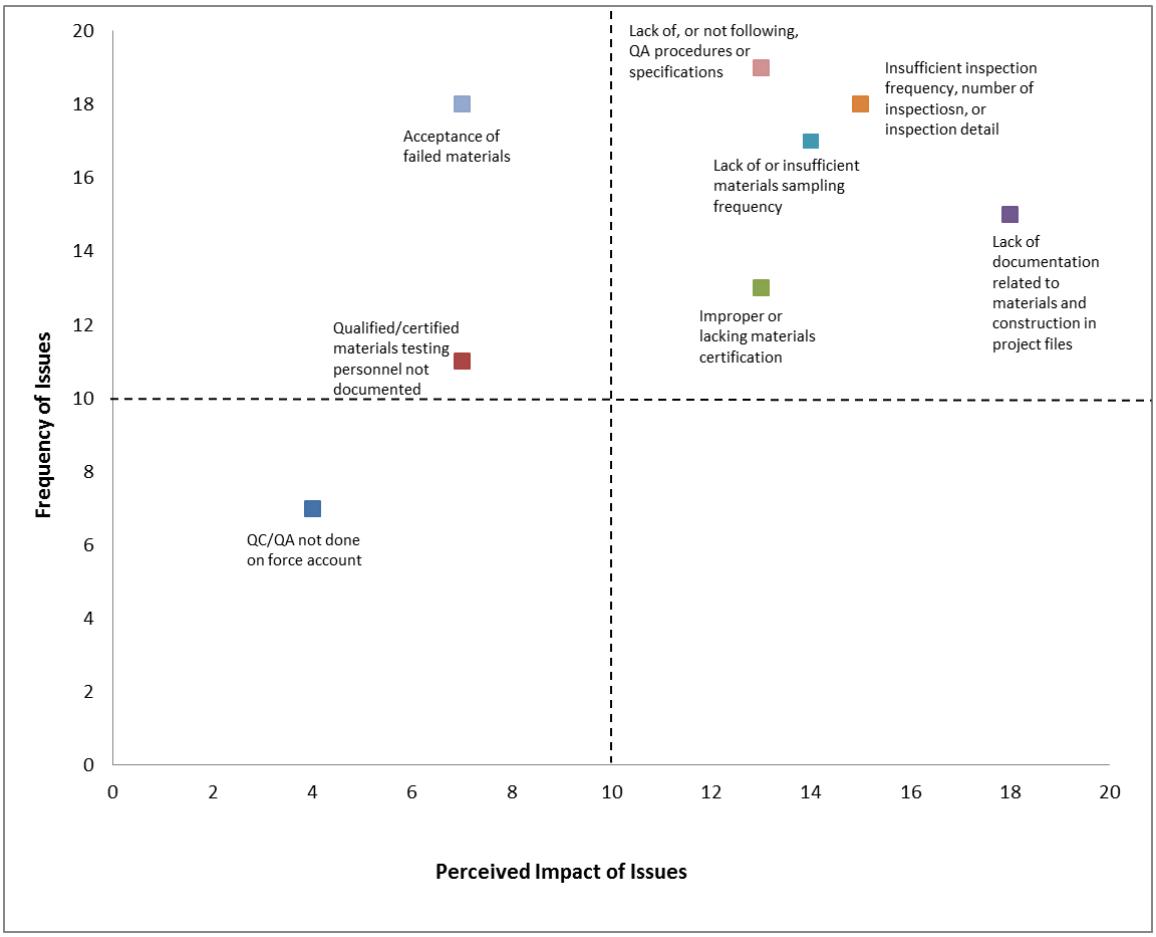


Figure 16. Scatter Plot. Ratings of State transportation department issues.

This evaluation indicates that the issues of greatest concern to State transportation departments were 1) lack of or not following QA procedures or specifications, 2) insufficient sampling or inspection frequency, and 3) lack of QA documentation. These issues are understandably a primary concern based on the State transportation departments oversight and stewardship responsibilities to ensure that LPAs comply with the 23 CFR 637 requirements. It also should be noted that an equivalent number of State transportation department respondents reported that these issues had a relatively low frequency of occurrence and minor or minimal impacts.

During the interviews, some of the same issues identified by State transportation departments from the surveys were raised by the State transportation departments (i.e., lack of or not following QA procedures). Several other issues were also raised during the approximately 27 interviews held with State transportation department, FHWA Division, and LPA staff. These are summarized in table 6. The table prioritizes the additional issues based on the number of times reported. It also identifies the source of the responses (State transportation departments or LPA), and perceived level of importance ranging from minimal to significant.

Table 6. Additional issues raised during interviews.

Other Issues Identified	Frequency	Raised by State Transportation Department	Raised by LPA	Significance Level
Cost of QA for LPA projects related to Federal-aid requirements for QA oversight, documentation, and electronic data management	5	No	Yes	Significant
Lack of communication among all project partners (FHWA, State transportation department, and LPA)	5	Yes	Yes	Moderate
State transportation department or consultant inspectors adhering to State transportation department standards or unreasonably strict standards for all projects	3	No	Yes	Significant
Confusing contractual obligations regarding testing and QA for LPAs and contractors	3		Yes	Moderate
Frequent staff turnover at LPAs (and State transportation departments)	3	Yes	Yes	Minimal
Compliance with IA challenging for smaller LPAs or not well understood	2	Yes	Yes	Moderate
Inconsistent QA oversight or inspection by State transportation department or its consultants	2	No	Yes	Moderate
Frequent updates of specifications or manuals for local agencies	2	No	Yes	Minimal
Poor testing equipment	2	Yes	No	Minimal

The State transportation departments interviewed generally reported that improvements with LPA quality were realized more recently after the completion of the ARRA 2009 program.[24] State transportation department interviewees also commented that significant improvements in QA were realized when LPA-specific guidance manuals and specifications were implemented. More than 22 State transportation departments have developed and implemented LPA guidance manuals. The team's content analysis, however, found that a smaller number of the manuals provided detailed guidance on QA procedures for construction.

Quite often the greatest "impact" on the LPA project perceived by both State transportation department and LPAs was the loss of Federal funding. Based on the general responses received from surveys and interviews, this impact was triggered by a lack of compliance with QA documentation requirements and procedures for Federal-aid LPA projects rather than by poor quality. Concerns expressed by State transportation department interview respondents noted in table 6 are discussed in more depth in the following paragraphs.

Lack of Communication

Lack of communication was identified as a reoccurring issue by both State transportation department and LPA respondents. Several State transportation department respondents indicated there was need for better, upfront communication of the project QA requirements particularly for LPA staff and/or consultant inspection staff at preconstruction meetings. This communication also needed to continue during the project, with periodic construction meetings attended by State transportation department and LPA staff. It appeared that this issue more often arose when State transportation department construction oversight staff were overextended (overseeing both State

and LPA projects). Several State transportation departments reported that they had implemented preconstruction meetings in conjunction with periodic training to better communicate QA requirements to all, including State transportation department oversight staff.

Frequent Staff Turnover

State transportation departments cited staff turnover at LPAs as an issue related to knowledge of Federal-aid QA requirements. Some LPAs reported that they deliver Federal-aid projects infrequently, and do not retain the in-house experience. Smaller State transportation departments, however, indicated that they did not deal with this issue because they used qualified former State transportation department consultant staff with extensive knowledge of Federal-aid requirements. An LPA similarly commented that State transportation department staff turnover caused inconsistencies in how QA oversight was administered from one district to another.

Compliance With IA

Based on the State transportation department survey responses and as further clarified during interview discussions, complying with Federal IA requirements for LPA projects is recognized as a challenge, particularly for smaller local agencies where the State transportation department does not routinely perform IA for LPA projects. Also it appears that IA requirements were not consistently understood by all LPAs. One State transportation department reported that IA was not performed for LPA projects for many years, but it now performs IA for LPA projects and certifies consultant testing laboratories on a statewide basis, which has greatly improved compliance.

Certification of LPAs by State Transportation Departments

Although not an issue raised by the State transportation departments, there appeared to be some ambiguity regarding certification/qualification programs evident during the interviews, revealing a need for further clarification and outreach on the possible benefits of such programs. The requirements for an LPA to become "certified" varied significantly among the State transportation departments interviewed. The interview discussions and a review of the previously collected literature suggest that a broad spectrum of certification/qualification processes is in use today, ranging from the LPA completing a simple self-assessment form or viewing training videos to the more rigorous, multistep interviews and partnering efforts to assign the LPA cradle-to-grave project responsibility. Because LPA certification/qualification is a key EDC initiative, an opportunity exists to standardize terminology and provide guidance on best practices related to LPA certification, particularly related to QA.

Large Versus Small State Transportation Department Programs

The perceived issues depend on the size and complexity of the State transportation department programs. The larger State transportation departments with commensurately larger, more sophisticated LPA programs shift greater responsibility for administration and oversight of projects to the LPAs that achieve "certified acceptance" or "certified" status while still retaining overall responsibility for QA through periodic auditing and recertification programs. The larger State transportation departments focus on ensuring that "certified acceptance" LPAs meet the 23 CFR 637 QA requirements. In conjunction with this, the larger agencies have, to varying degrees, developed a tiered approach to QA oversight, and may use less stringent LPA-specific specifications and guidance for noncritical projects. In contrast, the smaller State transportation

departments, or State transportation departments without LPA certification programs, provide more direct QA oversight with State transportation departments staff, often using the same level oversight for different project types, and using State transportation departments standard specifications and QA requirements.

LPA Perspectives

Cost of QA

The LPAs shared some of the same issues respondents noted in table 6, but the perception of issues differed markedly. For example, several of the LPA respondents reported that Federal-aid QA procedural documentation requirements for construction QA and closeout significantly increased costs, requiring additional internal resources and staff time, which reduced the direct dollars allocated to construction. This response was noted in both the survey and interview responses addressing the cost of QA in chapter 2 of this report. For example, in response to the survey question asking what percentage of project funds, one LPA noted in the survey results that the cost of QA for Federal-aid more than doubled (10 percent for locally funded versus 30 percent for Federal-aid projects). An LPA interviewee similarly reported that the cost of a Federal-aid portion of an ARRA project was approximately twice the cost of the locally funded portion. However, this QA cost issue was not raised by the majority of LPA respondents, and it was also noted that the additional costs on Federal-aid projects were in part caused by meeting other Federal-aid requirements (i.e., EEO, Labor Compliance, and Buy America).

While the surveys indicated that a greater level of State transportation department field inspection oversight was often applied to critical pavements and bridges, a significant number of State transportation department responses reported that the level of inspection by State transportation department or consultant staff (i.e., periodic detailed field inspections) was the same across all of the LPA project types. One LPA representative commented that the State transportation department used a "one size fits all" approach to QA oversight caused unnecessary expense, particularly on smaller, less complicated projects. Some of the larger LPAs (particularly the well-capitalized LPAs with dedicated local funding sources and in-house staff) also indicated that they would not use Federal funds on most of their projects, particularly ones with complications, unless required or absolutely necessary because of the additional cost and resources required.

Adherence to State Transportation Department Standards

Three LPA respondents commented that State transportation departments or their consultant representatives used unreasonably strict State transportation department standards for all Federal-aid projects. This perception, however, was not shared by all the LPAs, particularly smaller LPAs with fewer resources. The smaller LPAs shared the perspective of the State transportation department that for LPAs with few resources, the use of State transportation department or consultant resources for oversight and the use of standard State transportation department specifications worked well to ensure compliance with all Federal-aid requirements.

Best Practices Reported by State Transportation Departments and LPAs

The combination of survey responses and anecdotal feedback from interviews regarding best practices were evaluated and characterized, and are summarized in table 7. In both surveys and interviews, the State transportation departments and LPAs were asked to identify each of their effective practices. Selected State transportation departments were further asked to assess the level of implementation effort as low, moderate, or high (e.g., amount of staff time required, number of staff required, and cost required). They were also asked to rank the practices in terms of the level of effectiveness as minor, moderate, or significant (e.g., significant effectiveness would result in a major reduction in frequency of occurrences, improved streamlining, and require less State transportation department staff time).

Table 7. Effective practices used for materials and construction QA.

Best Practice Strategy	No. of Times Reported	Reported by State Transportation Department	Reported by LPA	Level of Implementation Effort	Effectiveness to Reduce Frequency or Impact of Issues
Training (Total Reported = 31)					
• Training of LPAs (for Certification with QA in mind), and State transportation department oversight staff	31	Yes	Yes	High	Significant
LPA-Specific Guidance/Documents (Total Reported (31)					
• LPA-specific guidance manuals	27	Yes	Yes	High	Moderate
• LPA specifications and QA requirements	4	Yes	Yes		
Effective QA Management by State Transportation Department (Total Reported = 30)					
• Dedicated, experienced State transportation department staff for LPA projects performing IA or other oversight services	16	Yes	Yes	High	Moderate
• State transportation department creates specification packages for LPAs	1	No	Yes		
• Periodic State transportation department site visits/inspections (weekly, quarterly, annually)	4	Yes	Yes		
• Follow-up procedure for addressing deficiencies in quality or paperwork.	4	No	Yes		

Best Practice Strategy	No. of Times Reported	Reported by State Transportation Department	Reported by LPA	Level of Implementation Effort	Effectiveness to Reduce Frequency or Impact of Issues
• Risk-based annual reviews or post-construction performance or partnering reviews of LPAs	2	Yes	Yes		
• Use of checklists	3	Yes	Yes		
Use of Consultants (Total Reported = 27)					
• Use consultants to do CEI	24	Yes	Yes	Moderate	Significant
• Use MCs or GECs to oversee LPA project	3	Yes	No		
Certification (Total Reported = 21)					
• Certification of LPAs (by agency or by individual project)	17	Yes	Yes	Moderate-High	Significant
• Use LPA certified and trained staff for QA	4	No	Yes		
Communication (Total Reported = 11)					
• Periodic stakeholder/community of practice meetings	4	Yes	Yes	Low	Significant
• All parties attending pre-design walkthroughs and/or pre-construction meetings	2	Yes	Yes		
• Complete QA and pay documentation review prior to final reimbursement	5	Yes	No		
QA for LPAs Same as for State Projects (Total Reported =8)					
• State transportation department administered oversight, inspection, and testing and/or acceptance	4	Yes	Yes	High	Moderate (Small Programs)
• Use of State transportation department standard specifications and QA procedures	4	Yes	Yes		
Buy Out Federal Funds With State Aid or Local Funds (Total Reported = 2)	2	No	Yes	Low	Moderate

Best Practice Strategy	No. of Times Reported	Reported by State Transportation Department	Reported by LPA	Level of Implementation Effort	Effectiveness to Reduce Frequency or Impact of Issues
Additional LPA funds Set Aside in Advance for QA Required on Federal-Aid Projects (Total Reported = 2)	2	Yes	No	High	Significant
Warranty Specifications (Total Reported = 1)	1	Yes	No	Moderate	Moderate

The best practices were assessed in terms of their frequency of use, in conjunction with their perceived level of effectiveness and implementation effort, as reported by the State transportation departments and LPAs.

Communication

This category consisted of a number of reported communication practices that improved understanding and compliance with Federal-aid requirements. These include periodic stakeholder, partnering, or community of practice meetings with all the project players as recommended by FHWA through its EDC 2 program to improve understanding of FHWA Federal-aid requirements. Effective project-level practices included attending predesign walkthroughs and preconstruction meetings to define requirements and roles and responsibilities, and requiring the development of specific QA plans for LPA projects. As a whole, these strategies were perceived to require a relatively low level of effort to implement with a significant level of effectiveness.

Use of Consultants

One area of focus arising from the interviews was exploring use of consultants for either oversight or day-to-day management of the construction phase of federally funded LPA projects. The use of consultants was viewed as both an issue and a best practice with a moderate level of effort to implement. LPAs routinely use consultant staff for construction management of LPA projects. Some of the larger LPAs with in-house construction staff viewed the use of consultants as adding an additional unnecessary layer of cost to the project or reducing quality because the consultants were not adequately qualified or experienced to perform testing or inspection. Smaller LPAs believed that the use of consultants was an effective practice for LPAs that do not have the internal construction resources or need additional staff infrequently to deliver larger projects. Both challenges and benefits were reported by both State transportation departments and LPAs, and a summary of both is presented in table 8.

Table 8. Summary of challenges and benefits reported for use of consultants on LPA projects.

Perceived Challenges	• Agencies pay more than services are worth for the quality of service received. • Consultants evaluating other consultants presents the potential for conflict of interest. • If the LPA spots poor workmanship, but has no recourse to correct it, it presents a risk to the LPA to accept lower quality and presents a risk to the State transportation department that the LPA can refuse to sign final acceptance. • LPAs are often motivated by reducing costs and hire unqualified or inexperienced consultants with no prior training on the Federal-aid requirements for the LPA program.
Benefits	• The majority of municipalities only infrequently deliver federally funded projects, and the LPA in-house familiarity is inconsistent. • Use of consultants helps to supplement staff shortages at LPAs and State transportation departments. • Consultants provide services to LPAs to assist in materials testing and are familiar with the construction specifications and process because many consulting firms employ former State transportation department engineers or inspectors.

Based on the information presented by a number of State transportation departments, it appears that, on the whole, the use of consultants for the construction portion of LPA project development is necessary in many cases for smaller LPAs and can be an effective practice to comply with QA requirements if implemented with certain conditions. A key criterion is that the consultant staff used by LPAs must come from a State transportation department prequalified process in which the consulting firm's capabilities and performance history is closely monitored.

An effective model to follow could be that of NHDOT, one of the smaller State transportation departments programs interviewed, where the consultants are trained and vetted by the State transportation department and then the list of consultants qualified for inspection and testing is given to the LPAs for use in the selection of consultants. An LPA with fewer resources (i.e., a town or rural county) generally relies on consultants for construction administration. When the State transportation department meets with the LPA at a preconstruction meeting, it establishes the requirements for the QA program, and expects the LPA to have under contract a testing agency certified for whatever work will be conducted (i.e., through the Northeast Transportation Training and Certification Program), and to provide a testing plan (e.g., soils compaction testing). The consultant under contract to the LPA must prepare the contract, plans, and specifications in a form as close as possible to the State transportation department's specifications, or in accordance with the department's LPA manual.

Consultants are also required to attend the NHDOT training at the same time as the LPA, once a project is awarded. The 2-day LPA training is done twice per year, and participants are issued a certificate that is good for 3 years. The State transportation department is starting to develop a recertification or refresher course; however, this course is more about the LPA process and project documentation. The State transportation department also offers a Construction School, which is a comprehensive training course also offered to consultants for 2 days to cover construction QA. As a result, the State transportation department observed a significant reduction

in QA issues in the LPA projects. On the whole, the success of the program was attributed to establishing defined contacts at the State transportation department for LPAs, assigning each project a State transportation department project manager to perform QA oversight, and requiring the mandatory training for LPAs and their consultants. (An LPA cannot start the project unless its staff have come to mandatory training and become State transportation department certified.) The State transportation department estimated that withholding of Federal funds, attributable to materials QA or construction QA issues, occurs in less than 1 percent of the LPA projects.

A unique approach to the use of consultants in an oversight role was first piloted by WisDOT more than 15 years ago and implemented statewide in 2006 in response to severe State transportation department staffing shortages. WisDOT delegates direct project oversight on LPA projects to an MC in each of its region, who reports to a WisDOT Regional Project Manager. The MCs provide reviews and spot-checks for preliminary design, environmental documentation, final design, and construction management. FHWA essentially treats MC oversight as WisDOT oversight. A February 2012 evaluation of the effectiveness of the MC program over the 6-year history of its statewide implementation revealed that LPA compliance, including compliance with 23 CFR 637 QA Federal-aid requirements, has improved significantly since implementation of the MC program and has not been shown to appreciably increase costs. The MC costs were strictly compared with the cost of State transportation department staff performing the same suite of management services. Concerns raised regarding the use of MCs from the State transportation department perspective included the potential for conflicts of interest, loss of expertise and experience by WisDOT personnel, and limiting of career advancement opportunities for WisDOT personnel.

The LPA perspectives on the effectiveness of the MC program in Wisconsin were mixed. A larger county with in-house construction resources commented that MCs' oversight was very rigid, using the same level of oversight for all project types, primarily served the interest of the State transportation department and not the LPAs that shared in the expense, and significantly increased the cost of QA oversight for Federal-aid compared with State-funded projects. A smaller county with limited in-house resources commented that the MC program in its region was very effective in helping the county manage its Federal-aid construction projects.

Based on feedback and ongoing discussions with its stakeholder groups, WisDOT is planning to continue with the MC program but improve its overall effectiveness, including developing a formal LPA certification program, developing standards more applicable to LPA projects, improving consistency in MC oversight among regions, hiring and training additional State transportation department staff, and conducting periodic stakeholder meetings.

Training

Based on the survey and interview responses, training was the most frequently cited best practice applying to both LPA staff and State transportation department staff providing oversight. As noted in process reviews, State transportation department district personnel and many LPAs were either not attending or were unaware of training available through their State on construction QA practices. For LPAs, the cost of training also can be an issue. LPAs cannot afford to attend training, particularly to become certified for materials testing, or do not have the right personnel to become trained. One suggestion was that the general training on LPA contract administration

should be supplemented with more specific targeted training related to use of electronic systems and forms, and QA inspection and testing for specific project types or elements. Web-based training was suggested as an alternative or supplementary measure. The initial investment in online training could be costly but would save the cost of attending classroom training. Some State transportation departments currently offer LPA training to LPAs without charge, but long-term funding is needed to develop and maintain training programs for State transportation department, LPA, and consultant staff.

Certification Programs

There has been much documented discussion in past process reviews and reports on the topic of the certification or qualification of local agencies. The data from the State transportation department survey was reviewed critically to identify whether any trends existed in terms of fewer instances of issues with construction or materials quality observed in States with LPA certification programs. The results of this review found that certification and qualification programs are not being clearly defined by, or consistently applied by, the State transportation department. Some of the agencies require fairly rigorous qualification standards (interviews, pilots, shadow projects, recertification, partnering, etc.), whereas other State transportation department require that LPAs provide financial documentation (forms) and that LPAs and/or their consultants watch a training video such as the FHWA's Federal-Aid Essentials for Local Public Agencies.

As an example of the more rigorous approach, WSDOT reported that 107 local agencies are designated as Certified Acceptance Agencies (39 counties, 63 cities, 4 port authorities, and Washington State Parks). The basis for eligibility is having appropriate and available LPA staff, along with a demonstration of satisfactory execution of federally funded projects through an "in training status." Of the 107 local agencies, 104 jurisdictions have achieved LPA certification. In Washington, LPA certification assigns LPAs the full responsibility for project design and construction. While there are noncertified jurisdictions that receive Federal funds, their limited responsibilities in project execution are defined in agreements with the State transportation department. WSDOT regional staff members perform a final documentation review on every LPA project at the completion of construction to ensure that the LPA built the project in accordance with the approved design plans and contract.

If deficiencies or difficulties are found, WSDOT regional staff will conduct one-on-one training with the LPA. WSDOT headquarters staff conducts program management reviews to assess LPA's compliance (rather than project-level compliance) and check that documentation is done appropriately. If an LPA is found to be out of compliance, then the agency is placed on a probationary status or its certification is revoked and more WSDOT oversight is assigned immediately. WSDOT indicated in the case study interviews that it will then take two or three successful projects completed by the particular LPA before they are reinstated to full delegation of authority.

The more rigorous approach, while requiring greater initial investment by the State transportation department and LPAs, appears to be an approach that will allow State transportation departments to delegate greater responsibility to qualified LPAs, reduce the level of State transportation department QA effort, while still meeting Federal-aid oversight requirements and empowering LPAs to take more responsibility for construction quality.

QA Management by State Transportation Departments

QA management by the State transportation department staff can be tailored based on the LPA type, size, or project risk/complexity. For larger "Certified" LPAs, State transportation department oversight may be limited to risk-based annual reviews or audits. For smaller or noncertified LPAs, State transportation department or their consultant staff may perform IA services, conduct periodic site visits/inspections, or provide full-time consultant inspection services and closeout QA reviews/audits. An additional effective practice included the use of checklists, a management practice cited in previous reviews. Overall, there were differences in the level to which management was applied by the State transportation department based on the frequency of inspections and on the number and types of LPA projects that are eligible for management by the State transportation department. Thus, the level of effort required by the State transportation department to provide QA services could range from low to relatively high. It would be beneficial for the State transportation departments to make these details clear in their LPA manuals and possibly they should be included in the content of the FHWA/State transportation department S&O agreements.

Regarding IA services, MaineDOT, a smaller program, uses two members of the State transportation department construction staff to perform all statewide IA, which includes LPA projects. MaineDOT also performs all asphalt laboratory testing for the LPAs, which was cited as a practice that reduces the number of instances in which the specifications are not being followed by contractors. Similarly, NHDOT assigns two or three IA staff, who comfortably handle IA on the number of LPA projects because their State has implemented system-based IA and QA. System-based IA allows the NHDOT greater flexibility to focus on individual LPA projects. NHDOT also has three QA consultants who are used on NHDOT project acceptance work but could be used on LPA projects. As a result of the IA management by the NHDOT, the sampling frequency is reduced for IA of LPA projects by taking into consideration smaller quantities.

In the case of larger programs such as WSDOT's, regional offices are responsible for contract oversight on LPA projects. They perform detailed reviews on contracts, design plan reviews, and periodic inspection for noncertified agencies. However, because of the agency certification process, they are only required to carry out a cursory review of certified agency project contracts. This method allows WSDOT to delegate more responsibility to the certified agency to comply with disadvantaged business enterprise, contract language, QA, and other administrative activities for the construction phase.

Final inspection of LPA projects is done by WSDOT regional local projects engineering staff. WSDOT does not use consultants for conducting LPA project final inspections because the inspections are considered a compliance activity. The WSDOT local program office stated that deciding how detailed the inspection should be has to do with the performance history of the LPA completing the project. For example, certified agencies with good performance records may not require more than windshield inspection on low-risk projects because they have demonstrated high-quality work and compliance with design standards previously. This process also follows along the same lines as the shifting of additional delegation of risk to certified agencies because WSDOT does not perform a full review of agency design plans. Only a brief check is done to ensure compliance with FHWA requirements. However, project-level quality assurance is done

by WSDOT primarily on accessibility projects and pavement jobs, or other work types that WSDOT has determined to be more high risk. For example, WSDOT performs detailed inspections on all accessibility projects to match grade requirements. State and regional WSDOT offices perform IA reviews to ensure compliance and identify systematic training needs.

LPA-Specific Guidance Manuals and Specifications

Based on a review of State transportation department literature, a majority of State transportation departments (39) have developed LPA guidance manuals, and in fewer cases have developed LPA-specific specifications or allow LPAs to use their own specifications. The development of these manuals can require a significant effort by internal State transportation department staff, but the interview responses from both State transportation departments and LPAs indicated that improvements in compliance with Federal-aid requirements have resulted from implementation of LPA-specific guidance manuals.

In recent years, States such as Ohio, Washington, and Florida have developed materials and construction specifications that are more tailored to LPA project elements. The motivation was to develop sampling and testing plans that are more suitable to the smaller scope and size of the majority of LPA projects. Each State has its own requirement in terms of when the LPA specifications can be used, but generally speaking, they are permitted on projects that are off the SHS.

For example, WSDOT, with participation from city and county representatives, has developed a standard specification for highway and municipal construction along with a lower-complexity LPA general specification. The generation of a separate specification for LPAs helps to streamline the design process for smaller, less complex Federal-aid projects that do not need to be held to more rigorous design standards. The version of the asphalt general specification that can be used for LPA projects can be viewed at the following Web address: http://www.wsdot.wa.gov/LocalPrograms/LAG/HMA.htm.

FDOT started transitioning its full specifications to streamlined LAP specifications for earthwork, asphalt, concrete, and landscaping in 2007.[24] The LAP specifications are approved for use only on local roadways that are off the SHS. The asphalt and concrete specifications were compared to identify general differences between the full-blown State version and the abbreviated LPA version. The results of these comparisons are presented in table 9 and table 10. Generally speaking, the primary changes made to the materials specifications for LPA use include a modest reduction in the sampling frequency and quantity of samples, along with slight relaxation of the conditions (e.g., temperature or haul times) in which the samples or measurements are taken.

Table 9. Differences in specification requirements for asphalt concrete.

FDOT Asphalt Specifications	FDOT LAP Asphalt Specifications
• Asphalt binder content, mix gradation, and volumetric properties must be tested at a minimum frequency of once per day. • If production exceeds 1,000 tons, perform test a minimum of twice per day.	• Asphalt binder content, mix gradation, and volumetric properties (process control testing) must be tested once per day. • No testing if production is less than 500 tons and engineer approves by visual inspection.
• Monitor roadway density cores with 6-inch diameter cores, a nuclear density gauge, and/or other density-measuring device at a minimum of once per 1,500 ft of pavement.	• Roadway density measurements with 6-inch diameter roadway cores at a minimum frequency of once per 1,500 ft of pavement with a minimum frequency of three cores per day.
• Density measurements need not be taken when layer thickness is greater than or equal to 1 inch; instead may use an approved rolling pattern.	• Lists various conditions in which density measurements do not need to be taken (e.g., not on bridge decks /approach slabs, widening strips, shoulders of 5 ft or less, etc.).
• Include specifications for when mixture temperatures taken are more than plus or minus 25° F, then the mix shall be rejected from the site. • Require testing of first five trucks that arrive, and one of every five trucks after that, for temperature testing.	• All mixes outside a plus or minus 30° F range from the design temperature shall be rejected from the site. • Frequency of truck mixture temperature testing: Not applicable.

Table 10. Differences in specification requirements for Portland cement concrete.

FDOT Concrete Specifications	FDOT LAP Concrete Specifications
• Use sampling and testing methods from ASTM-C and ASTM-FM.	• Use sampling and testing methods from ASTM-C.
• For all structural elements incorporated into project, perform plastic property testing and cast a set of three QC cylinders (4- or 8- or 6- by 12-inch cylinders are acceptable) for 28-day compressive strength. • Sampling frequency determined by the class of concrete being used.	• For structural elements, the engineer randomly selects a sample from each 200 cubic yards, or 1 day's production, to determine the plastic properties and to make three 4- by 8-inch cylinders for 28-day compressive strength testing. • Nonstructural concrete elements do not require compressive strength testing, or it is at the discretion of the engineer.
• For small quantities of concrete less than 50 cubic yards, the total will be accepted based on satisfactory compressive strength cylinders with certifications of where concrete was batched and that it was placed according to contract documents.	• With engineer approval, small quantities of concrete less than 3 cubic yards placed per day, or less than 0.5 cubic yards placed in a single placement, may be accepted using pre-bagged mix, as long as the engineer ensures that the pre-bagged mix is prepared according to the manufacturer's recommendations.
• For all concrete mixes, the delivery times for non-agitator trucks are 45 min or 75 min when water-reducing and retarding admixture is added from when the water is introduced into the mix until it is placed. • For all concrete mixes, the delivery times for agitator trucks are 60 min or 90 min when water-reducing and retarding admixture is added from when the water is introduced into the mix until it is placed.	• For only structural elements, 90 min delivery time is allowable for the transit time of concrete.
• Do not place concrete when temperature exceeds 85° F but less than 100° F, and reject all concrete placed at temperatures exceeding 100° F.	• Do not place concrete when temperature exceeds 86° F but is less than 100° F, and reject all concrete placed at temperatures over 100° F.

Additional strategies reported included buyout of Federal funds with State aid, an LPA strategy to apparently avoid the additional effort/cost of compliance with Federal-aid requirements, and setting aside LPA funds in advance for Federal-aid projects, a difficult practice for most LPAs with limited resources and local funding sources.

Several State transportation departments responded that the use of the same QA practices as used for State projects was effective in assuring compliance. This approach, although considered effective for smaller State transportation department and LPA programs, was also viewed as a significant issue by larger LPAs, which resulted in unnecessary cost and effort, particularly for less critical project purposes.

ALIGNMENT OF ISSUES WITH SUGGESTED BEST PRACTICE SOLUTIONS

The State transportation departments were asked in the survey whether they employ any practices that have been successfully applied to mitigate challenges with QA in LPA projects. A number of State transportation departments offered comments on the types of practices and to what extent these successful practices mitigate any challenges associated with materials and construction QA on LPA-administered projects. Information was also gathered via telephone and in-person interviews with the 10 focus States, and was combined with data from State transportation department and LPA surveys, addressing what solutions these agencies would suggest for improving issues or challenges that were reported.

Table 11 summarizes the key issues, sources by topic area, and proposed solutions. The key issues that were raised in the survey responses and the interviews were grouped into general categories and aligned with suggested best practice solutions offered by both State transportation department and LPA respondents. The categories are included only to simplify the alignment of issues with best practices. In some cases, there are multiple best practice solutions to a given issue or vice versa. The issues and proposed solutions also varied based on the source (i.e., State transportation department, large versus small LPAs). Lastly, the research team recommended the party or parties in the best position to manage suggested solutions.

Table 11. Summary of challenges and successful practices to mitigate challenges.

Description of Key Issues/Challenges	Suggested Solutions	Recommended Party(s) to Manage Improvements
State Transportation Department/QA Management		
• Shortage of dedicated State transportation department staff causing a lack of verification testing or IA • Compliance with IA is challenging	• Dedicated, experienced State transportation department or consultant staff for LPA program oversight or IA • Periodic State transportation department site visits/inspection to review LPA project QA documentation	State transportation department headquarters with assistance of State transportation department district and materials staff and LPA stakeholder committee
• Lack of LPA documentation in areas such as completion of construction diaries; and appropriate QA document retention of QA test results • Inadequate LPA project inspection and testing frequency	• LPA-specific guidance manuals or project delivery manual, which covers all of the LAP projects and includes several sections that address QA in construction • LPA manual online QA training for State transportation departments and LPAs with "how to" PowerPoint tutorials for QA requirements	
• LPAs not following State transportation department specifications (for on-SHS or critical projects)	• State transportation department prepares plans and specification packages for on-system LPA projects that are accessible to anyone in the State transportation department	
LPA/QA Management		
• Materials records online documentation is extensive and often delays final project closeout • Project closeouts not done within 60 days of construction completion	• At pre-construction meeting, outline in flow-chart (or checklist) QA requirements and milestones at which LPA needs to input materials data generated on project or category basis • Follow-up procedures for timely addressing of QA deficiencies in paperwork	State transportation department headquarters with assistance of State transportation department district and materials staff and LPA stakeholder committee
• Consultant and contractor selection burdensome to small LPAs that deliver one Federal-aid project every several years (or one time only) and that do not have the personnel or technology	• Establish a State transportation department based open-end (OE) consultant contract to be available to the small "one-project" LPAs. OE consultant performs project management and the QA/QC process, suggested for projects costing under $1.0 million	
• Smaller LPAs do not have adequate staff to manage construction QA	• Use qualified consultants for CEI testing and inspection services • Use dedicated State transportation department staff to administer QA and use standard State transportation department specifications and QA procedures	
State Transportation Department, LPA/Communication		
• Lack of communication (all project partners)	• Community of practice or stakeholder group to promote best practices • Partnering • Predesign or preconstruction walkthroughs/ meetings to clearly define QA responsibilities to project team in advance of construction • Periodic State transportation department site	State transportation department headquarters, and LPA project team

Description of Key Issues/Challenges	Suggested Solutions	Recommended Party(s) to Manage Improvements
	visits/inspection to address QA issues and solutions • Programmatic work plans between the State transportation department and LPA every 3 years to track what has been implemented and identify new issues and opportunities	
LPA/Risk-Based Tiered QA Oversight		
• Cost of construction engineering and oversight, including the CEI and testing consultants, is increasing linearly and is becoming a significant portion of the project cost. Many LPAs underestimate the funding needed. • State transportation department or oversight consultants use unreasonably strict standards for all projects by applying standard State transportation department inspection, testing, reporting, and paperwork requirements, or a one-size-fits-all approach to administration and QA oversight of LPA projects causing unnecessary additional costs.	• Risk-based tiered approach allowing State transportation department staff to do random or reduced QA oversight on projects that cost less than $500,000 or that are managed by a "certified acceptance" LPA, or reduced QA oversight for a low-risk LPA project purpose • Develop more flexible QA standards for LPA projects, including QA that better fits LPA project types and risks • Implement certification standards and requirements for LPAs so that State transportation departments can delegate greater responsibility to qualified LPAs, reduce the level of State transportation department QA effort while still meeting Federal-aid oversight requirements. Certification should require qualification standards, including interviews, pilots, shadow projects, and recertification • Implement training, both in-class and Web-based as part of the LPA certification and recertification process	FHWA Division and State transportation department
State Transportation Department/Training		
• Frequent staff turnover at LPAs • No tracking of LPA staff turnover and whether the staff member managing the project has been trained	• New staff at the LPA (and/or the consultant working along with the LPA) must register with the State transportation department and take a 4-hour basic training program at the State transportation department to conduct a Federal-aid project	Funds could possibly come from FHWA to the LPA through Technology Transfer funds (LTAP)
• State transportation department training for certification purposes may not be detailed enough for QA purposes	• Training (targeted to specific QA topic areas), especially if recorded and made available for LPAs on the Web to view as many times as they need to. • Web-based training on QA topics required as part of the LPA certification and recertification process	
• State transportation department and FHWA training sessions are not Web-based or recorded for later viewing	• Provide Web-based training delivered by FHWA for LPAs to be able to access more easily (e.g., information on how to rank consultants) • Provide smaller training sessions that target the LPA program in smaller components (e.g., procurement, materials, inspection, etc.) and get more specific and in-depth.	

Description of Key Issues/Challenges	Suggested Solutions	Recommended Party(s) to Manage Improvements
LPA/Training		
• Inconsistent QA oversight or inspection by State transportation department or its oversight consultants • Consultants not properly qualified or trained for LPA projects; add an additional layer of cost	• Staff at the State transportation department dedicated to LPA program (and/or the consultant working with the LPA) must take a basic training and certification program through LTAP or at the State transportation department to oversee an LPA Federal-aid project	State transportation department districts and/or State transportation department headquarters—Funds could possibly come to the State transportation department through Technology Transfer funds from FHWA
• Continual updates of the State transportation department specifications occur at such a high frequency that it is challenging for the LPAs to keep track of the changes	• LPAs are alerted to changes in the State transportation department specifications via once-a-week email alerts that they must sign up for (and many LPAs are not aware of this step)	State transportation department headquarters

The evaluation of best practices solutions suggest that some solutions would be applicable to both State transportation departments and LPAs, whereas others would apply only to LPAs, either for larger or smaller programs. For example, both State transportation departments and LPAs indicated that training should be a required element of an LPA certification (and recertification) process for conducting Federal-aid projects. Also, both entities agree that the training should be parceled out in shorter segments (less than 1 hour in length) to keep each module concise, but also be in-depth and focused on specific elements of LPA administration, including construction QA. All of the State transportation departments agreed that training requires dedicated long-term funding with assistance from FHWA for funding, developing, and maintaining the training.

Some of the LPAs, particularly with larger programs, want to use a more risk-based approach (or tiered system), for construction QA tailored to the LPA project's purpose. This suggestion was based on various observations by both State transportation departments and LPAs that there are instances of excessive amounts of QA testing required on small quantity projects. Part 23 CFR 637 would support a risk-based approach, particularly for verification testing or acceptance by certification or visual inspection for small quantities or noncritical materials so long as the State transportation department ensures that the essential QA requirements for Federal aid are met; however, it does not provide specific guidance on how to accomplish the shift to a risk-based system. In concert with a risk-based approach, the LPAs, particularly larger programs, would also like to see State transportation department QA requirements and standards tailored to LPA projects, primarily to reduce the amount of QA administrative paperwork.

CONCLUSIONS AND RECOMMENDATIONS

The conclusions presented in this report were drawn from information provided through the following sources: existing literature on LPA programs, surveys of both State and local public transportation agencies, and in-depth interviews with both State and local public transportation

agencies. The major deficiency identified and reported through this study, as in previous FHWA reviews, concerns the collection and retention of the appropriate QA and other administrative documentation for federally funded LPA projects. In spite of this deficiency, there were very few instances of poor materials quality or workmanship impacts anecdotally reported in this study. This leads to a conclusion that if the federally funded LPA projects are not experiencing poor workmanship and poor construction quality, then QA testing and supporting documentation can be tailored to fit the project type or purpose. The levels of construction QA testing and inspection can be adjusted accordingly based on the perceived level of risk or criticality of the project element.

The findings of this study also showed that smaller LPAs often lack the resources to perform construction QA and to consistently complete the QA documentation required on federally funded projects. At the same time, the larger LPAs reported that they have the training, staff qualifications, and capabilities to take on more of the QA role. Thus, it appears that a tiered system should be considered in which larger LPAs can achieve certification to take on a greater responsibility for QA, and smaller LPA projects can continue to be managed either by consultants (hired by either the State transportation department or the LPA) or by the State transportation department. There were reported benefits and challenges to both types of management strategies, and it would be up to an individual State transportation department to determine how best to address these challenges in their State.

Based on these conclusions, and on the recommendations offered by both State and local public transportation agencies, a number of recommendations can be offered for consideration. The recommendations for optimizing QA for LPA projects also address who would be the party responsible for managing the improvements.

Recommended QA Practices for LPA Projects

Communication

Based on the findings of this study, the importance of communication and advanced planning cannot be stressed often enough. It is recommended that the State transportation department or its consultant representatives attend preconstruction and/or pre-paving meetings for all LPA projects. In Florida, construction feasibility reviews and predesign walkthroughs of the project to be constructed are performed by the State transportation department District Construction staff (including District Materials for critical or LPA projects on the SHS) and the LPA staff to identify issues early before design. The practice was reported to have beneficial impacts in providing immediate State transportation department construction and materials feedback prior to completion of the LPA's design plans.

Direct and frequent communication during the project was considered a successful practice for mitigating issues with materials and construction QA, particularly when all parties (FHWA, State transportation department, and LPA) are periodically involved. The success of LPA projects in the construction phase was often attributed to frequent communication between the LPA staff and the State transportation department construction and IA staff. However, the communication should be strategic and clear and should extend beyond training.

The use of periodic statewide or regional stakeholder meetings or focus groups sponsored by the State transportation department, including periodic stakeholder partnering or community of

practice meetings with all the project players, is a communication tool recommended by FHWA through its EDC 2 program to improve understanding of FHWA Federal-aid requirements. The meetings may include FHWA Division Offices, State transportation department, LPA, consultant and contractor representatives to discuss issues, share best practices, and improve construction QA.

The FHWA (primarily through the Division Offices with support from the Resource Center, Turner-Fairbank Highway Research Center, and Headquarters) can work with the State transportation departments to establish mitigation plans on some periodic (e.g., every 2 to 3 years) basis. In adopting such a strategy, the opportunity exists to track how well the policies and practices related to the mitigation of materials and construction QA issues are working. It is also an opportunity to identify any new issues that have evolved and require the generation of new guidance, training, or tools for the State transportation departments and LPAs.

Consultants

A State transportation department that does not have adequate staff to cover the number of LPA projects active at any given time, should consider hiring MCs to help ensure that Federal-aid QA requirements are met for the QA activities related to the program. However, if a State transportation department elects to procure the help of MCs, it is critical that it maintain responsibility and oversight of the LPA program and use program reviews or audits at a specified frequency to ensure that there is consistent oversight and no conflict of interest between different levels of consultants involved in the overall LPA program. The emphasis on maintaining oversight comes directly from the 23 CFR 172.9(a) and 23 CFR 635.105, as well as FHWA Memo: Responsible Charge (08/04/11) in the sections related to conflict of interest.

For smaller LPAs that require the use of on-call consultants for construction inspection and testing, the State transportation department should establish a State transportation department based open ended (OE) consultant contract to be available to the small "one-project" LPAs. The OE consultant performs project management and QA. This process is suggested for projects costing under $1.0 million. These consultants should also be trained and certified to perform QA inspection and testing.

Where LPAs are required to use consultants to be eligible for receiving Federal funds for transportation projects, it is recommended that the State transportation department consider a tiered system. There were a number of State transportation departments that required that LPAs hire consultants on all federally funded projects, regardless of the project's purpose, a practice that was increasing costs. Therefore, it may be beneficial for a State transportation department to establish criteria regarding which types of LPA projects it may require the use of consultants (e.g., a tiered level of effort) to allow smaller LPAs to use more of the available Federal funds on project components rather than project management.

LPA Guidelines and Manuals

State transportation department should develop and maintain LPA-specific guidance manuals or LPA project delivery manuals, which cover all of the LAP project types and include sections that specifically address QA in construction. A review of the existing manuals revealed extreme differences in the breadth and depth of information provided to assist the LPAs. Several State transportation departments focus primarily on preconstruction issues such as project selection,

utility and railroad coordination, and ROW acquisition, with very little guidance on construction administration and QA. Several State transportation departments have made a considerable effort to provide guidance on how to perform materials testing and construction inspection and documenting the results (e.g., California, Washington, Maine, New Hampshire, Virginia, Georgia).

For example, one of these manuals includes a separate sampling and testing program guide for LPA-managed Federal-aid projects, requiring LPAs to develop a specific QAP for each project. The LPAs are required to define in their QAPs the quantity of each item in the project that requires sampling and testing, the number of acceptance tests required, an anticipated schedule for testing, the name and contact information for the party conducting the acceptance tests, and the sources of materials, including production plants for ready mix concrete, HMA, precast concrete, and structural steel. Frequency of sampling and testing tables are provided for soils, asphalt items, concrete items, and structural steel. For materials not included on these tables, the LPA may base acceptance on the producer's certification that the material meets the appropriate State transportation department specification or inclusion of the material on the State transportation department QPL and submittal of a certificate of compliance.

This or similar guidance manuals can be used as examples for a State transportation department to develop or enhance its existing LPA manual with specific QA guidance. Finally, in conjunction with the guidance manuals, State transportation department should consider LPA manual online or in-class QA training for State transportation department (and LPA) staff, with "how to" PowerPoint tutorials on QA requirements.

LPA-Tailored State Transportation Department Specifications and Standards

Construction and design standards currently being required for use on federally funded LPA projects should be revisited to assess their applicability to the various types of LPA projects. The study findings revealed that the State transportation departments that generated LPA-specific materials and construction specifications that are more suitable to fit a particular LPA project purpose found it to be a worthwhile investment and had fewer instances of nonparticipation as a result. Furthermore, tailoring State transportation department specifications to be more relevant for local projects would eliminate the frustration reported by some LPAs regarding a one size fits all approach to State transportation department specifications for LPA projects.

Several State transportation departments have revised their materials specifications for certain qualifying projects on locally owned roads by reducing the testing frequency for smaller quantity jobs, extending the range of acceptable temperatures (+/-) for placement on site, and extending permissible delivery and transit times of materials, etc. One State transportation department indicated that it is considering creating simplified versions of the standard materials testing frequency tables for asphalt, structural concrete, and earthwork for LPA projects.

As an additional consideration, LPA bridges, box culverts, or other projects with construction values over $10.0 million are classified as "critical" in one State and held to the same materials testing and reporting standards as State roadway projects even if they are on the local road network. An issue raised by the LPAs in that State is that the "critical" portion (e.g., a bridge or culvert that is a component of a broader local roadway project) may only be a very small part of the overall project limits; however, the State standards would apply to the entire project and incur more cost. Thus, when critical elements constitute a small portion of a project, it would be

more cost effective to implement an LPA-tailored specification and apply standard State QA requirements to only those critical elements.

Finally, several State transportation departments, particularly smaller more rural programs, stated that using the State transportation department standard specifications and QA procedures for their Federal-aid LPA projects was a best practice and has worked well to assure that LPAs comply with 23 CFR 637 QA requirements. While this practice simplifies the QA oversight of LPA projects for the State transportation department, it may not result in the optimal approach to meeting those QA requirements and may place a greater cost burden on the LPAs than necessary to achieve construction quality for less critical projects. Many of the LPA survey respondents indicated that QA costs can represent a significant percentage of project costs for Federal-aid projects. State transportation departments currently using this standard specification approach should consider piloting a project with LPA-tailored specifications that provide more flexibility in QA requirements and then assess the benefits to the State transportation department and the LPA.

Stewardship and Oversight Agreements

FHWA Division Offices should consider reassessing the current version of their S&O agreements to place more emphasis on the areas of materials QA and construction oversight, particularly as they relate to LPAs. It would be beneficial to provide the State transportation departments with a clearer vision of the expectations that FHWA has for the administration of the LPA program in the construction phase. The S&O agreements for States such as Arkansas, Colorado, Florida, Iowa, and Ohio, give clear guidance on items such as responsibilities during construction and specific actions that cannot be delegated to LPAs, performance measures, and materials QAR review details. These documents can serve as starting point examples for FHWA to consider in future revisions of S&O agreements.

Certification Programs

One initiative that is being recommended through FHWA EDC 2 is to improve the Federal-aid projects administered by LPAs and mitigate the potential for noncompliance by encouraging State transportation department to develop certification or qualification-type programs.[(4)] These programs use criteria to ensure that the LPA is qualified to manage project activities that use Federal-aid funds. The FHWA-listed benefits of the certification program are in the areas of compliance, risk mitigation, resource reduction, and local ownership (allowing certified LPAs to manage and own their projects). Based on the findings of this study, a need exists for further clarity in defining what the criteria for LPA certification should be (particularly for QA) and for this information to be deployed consistently through national guidance from FHWA. The WSDOT certification program is a good model to consider as a starting point for wider adoption.

Smaller LPAs: Smaller LPAs reported that for the most part they prefer more involvement and guidance from the State transportation department. Thus, if the State transportation department has adequate, dedicated staff for the LPA program, the smaller LPAs would benefit from its involvement in QA, including performing testing and IA. For State transportation departments that do not have adequate staff to manage the construction phase of federally funded projects for the LPAs, it is recommended that consultants be used for oversight in a management role or for inspection and testing. The consultants should be trained and certified. The findings also suggested that the best approach to IA would be for the State transportation department manage it

rather than assume responsibility for it. If the State transportation department will be performing the IA on an LPA project, it can be challenging to track ongoing testing to schedule the requisite IA activities. The LPA must take care to cooperate fully with the State transportation department's IA personnel. For large projects, using the system approach to IA (in which IA frequency is based on covering all active testers and equipment over a period of time, independent of the number of tests completed on a particular project), can also be an effective strategy.

Larger LPAs: The larger LPAs consistently reported that they would prefer to have more autonomy and retain administrative control of QA and other costs in the construction of federally funded LPA projects. The implementation of an LPA certification program would allow larger agencies to take more responsibility for QA.

An example of a proposed two-step or tiered process for certification is illustrated in figure 17. As a first step, the LPA would submit its qualifications with the required documentation. The State transportation department would then conduct an interview with LPA staff to review past performance, current in-house staff, QA and construction inspection capabilities, and knowledge of Federal and State requirements. Given that the results of the interview are acceptable, the State transportation department would conditionally certify the LPA (e.g., Tier 1). The State transportation department and LPA would then select an appropriate demonstration project for the LPA to administer on a trial basis.

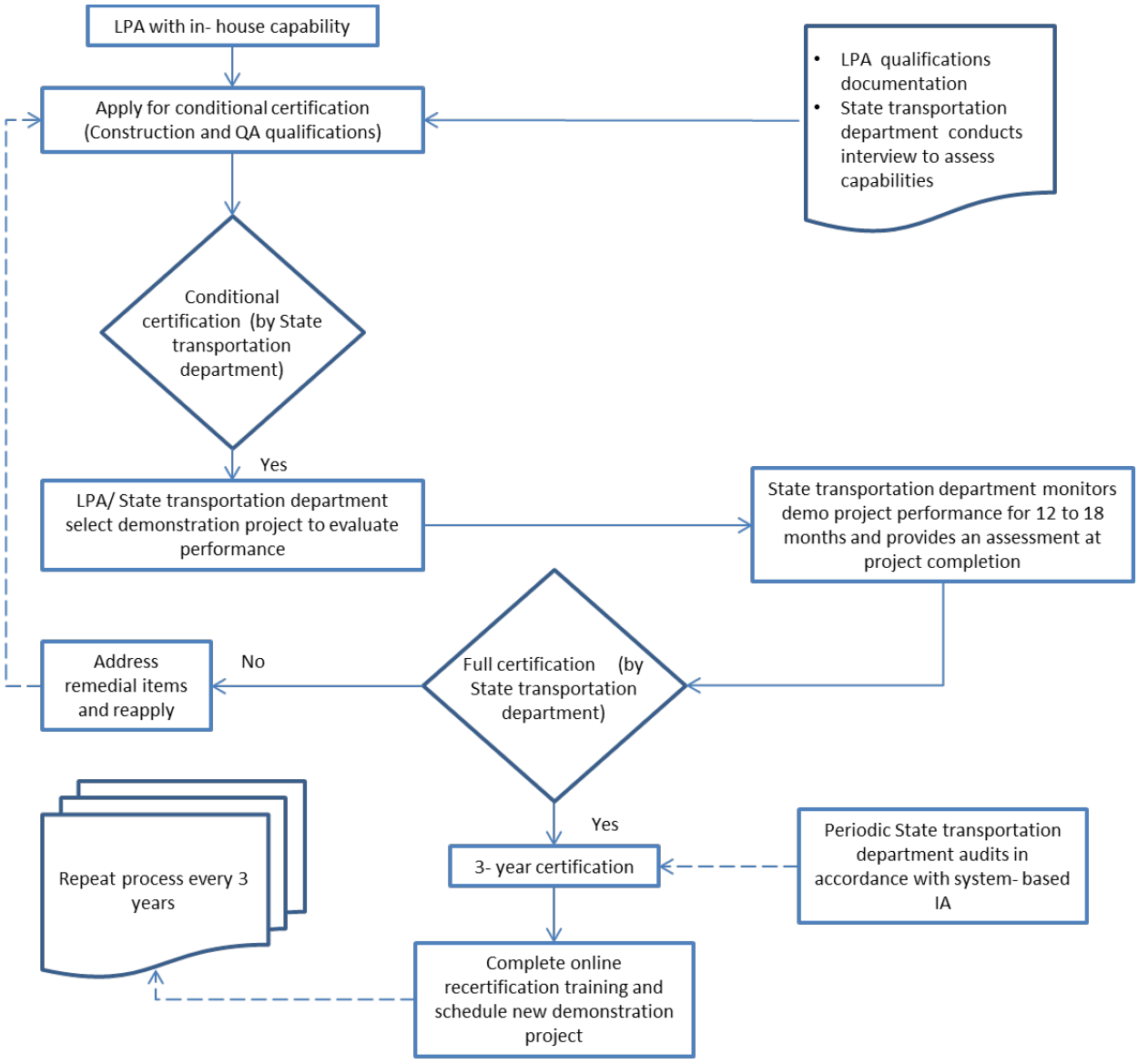


Figure 17. Diagram. Process for tiered certification of an LPA.

It is recommended that the larger agencies seeking certification conduct a demonstration project prior to being permitted more independence with QA of construction and materials. This will give the State transportation department the opportunity to assess the LPA's capabilities in performing quality oversight and the completing the appropriate QA documentation before approving the LPA for full (e.g., Tier 2) certification.

As noted in figure 17, the State transportation department should monitor the demonstration project for its duration (12 to 18 months are assumed). At completion, the State transportation department will assess the performance of the LPA and either approve the LPA for full certification or provide a list of remedial actions for the LPA to address to reapply for certification. With full LPA certification, the State transportation department would be required to conduct periodic audits and/or system-based IA as part of its stewardship responsibilities.

With a certification program where the LPA will have full responsibility for QA, it is recommended that a periodic recertification program be established to address potential staff turnover or training new staff. The recertification process should include mandatory periodic (e.g., every 3 years) training that the LPA engineering and/or public works staff should attend. It is also recommended that the recertification training be recorded in an online format (accessible online such as through an LTAP or a university's distance learning) to address the scheduling challenges or travel restrictions often experienced by local staff. The State transportation department will still be encouraged to conduct its routine random audits on the large agencies that are certified and would ideally maintain a system-based IA program.

Recertification can also be tied to satisfactory performance (condition assessment) of the demonstration project over the 3-year full certification period. For example, WSDOT requires the tracking and reporting on the condition of local bridges and city arterial pavement conditions as part of the LPA project delivery, and it is part of the decision whether to certify (and to what level) an LPA.

Risk-Based Tiered System for LPA Projects

Based on the findings of this study, there appears to be a need to align the expectations of quality more closely with the LPA project's purpose. The findings indicate that it may be beneficial for the FHWA to revisit how quality on federally funded LPA projects is currently being defined and to what level it should be documented. The materials sampling and testing activities for QA should be potentially structured as a risk-based (or tiered) system that considers the LPA project's purpose and scope. The Washington, Florida, and Virginia State transportation departments have incorporated elements of a risk-based approach to QA oversight, and it is recommended that the approaches used by these agencies be investigated further for LPA projects to assess the advantages of allowing more flexibility without compromising quality. The risk-based (tiered) framework for materials QA acceptance that has been crafted by WSDOT is not intended for local projects in its current form; however, it would be a good starting point for guiding States on how to set up a similar process for the LPA program.[(26)] The options for establishing a risk-based system could be based on a project cost threshold or the criticality of the project or the element. For example, VDOT defines three levels of oversight (including QA) based on criticality of project elements as noted in appendix F.

For less critical projects, only random site visits or QA audits are applied in conjunction with delegation of approval authority and responsibilities within a State transportation department (i.e., in decentralized State transportation departments). For more critical projects or purposes, more frequent site inspections and/or testing would be required. It is clear that the move to a risk-based system should be calibrated to each particular State (i.e., what works for a small State-owned system such as in Delaware would not be suitable for a large county-owned system and a decentralized State transportation department such as in Texas). In addition, the move to a risk-based system would exhibit the most promise if tied simultaneously to the implementation of an electronic online project tracking and management system, similar to those currently used by Florida, Alabama, and Minnesota State transportation departments.

The establishment of a tiered system for LPA projects that move into the construction phase would allow delegation of responsibilities and approval authority to the State transportation department district level for decentralized State transportation departments, or to the

maintenance districts for centralized State transportation departments, particularly for less critical projects for which the risks to QA are lower. This recommended delegation of certain responsibilities to the regional area would serve to streamline internal State transportation department approvals and reviews on LPA projects, as well as allow better tracking of LPA staff levels and capabilities. The implementation and maintenance of an integrated electronic tracking system for LPA projects would be a key to the success of moving toward delegation.

Training

The reporting of best practices and suggested solutions clearly indicated that the training of LPAs and their consultants had a high level of effectiveness in reducing the frequency of issues with QA. It is recommended that the training be parceled out in shorter segments (less than 1 hour in length) to keep each module concise, but also be in-depth and focused on current challenges. The most effective way to do this would be to make some of the training segments Web-based, similar to the FHWA Federal Aid Essentials training series. It is recommended that there be dedicated long-term funding, along with the assistance of the FHWA for funding, development, and maintenance of the courses.

The FHWA Federal Aid Essentials training video on Construction QA was reviewed in its entirety, and the presentation of the content clearly explains the basic considerations involving incorporation of the different levels of QA in the construction of LPA projects. The discussion on QA programs outlines the roles and responsibilities for LPAs and encourages the LPAs to use the State transportation department's QA program in their State. A distinction between the requirements for QA for LPA projects on and off the NHS was made. QA specifications routinely involved with LPA projects (contractor QC, agency QA acceptance criteria, and materials quality payment adjustment specifications) were also introduced broadly.

Based on the findings of this study, it is recommended that the FHWA consider developing additional videos within the topic area of QA, but to address the most frequently observed or most significantly affected topics uncovered as part of the review. These topics include system-based and project-based IA programs; estimation techniques for the cost of construction engineering, including the CEI and testing consultants; importance and impact of materials sampling frequency; daily construction records for LPA projects; construction dispute resolution for LPA projects; and managing materials testing subcontracts.

It may strengthen the learning content to include one or two example cases for each of the topics that show the problematic situation that occurred, the actions taken by the LPA, State transportation department, and/or FHWA, and the resolution to the situation (and perhaps also an explanation of how the project would have been conducted for QA to have been done correctly). A few examples of this type were provided by LPAs and State transportation department as part of this study.

Regulations

The development of a document similar to the FHWA Form 1273, as shown in appendix L, that assembles key Federal requirements for consulting engineering and construction contracts for use on LPA projects is recommended, prepared with feedback from stakeholders such as the

American Public Works Association (APWA), American Council of Engineering Companies (ACEC), and the National Association of Corrosion Engineers (NACE).

As noted in FHWA's procurement memorandum, procurement for projects not located within the highway ROW can follow State procedures rather than the Federal procurement process (49 CFR Part 18 2004). This flexibility applies to projects not within the highway ROW for most Federal-aid programs, including Transportation Enhancement Programs, Recreational Trail Programs, National Scenic Byways, Congestion Mitigation and Air Quality, Off-System Bridges, etc., but excludes the Safe Routes to Schools Program and Nonmotorized Transportation Pilot Program. The memorandum explains that when an LPA is the contracting agency for a Federal-aid nonhighway construction contract, it is held to only State-approved procedures. This use of State laws and procedures also applies to the State agency's awarding and administering of subgrants to local agencies. The flexibility exists for a State transportation department to advise LPAs to follow State procedures, local government procedures, or the procedures laid out in 49 CFR 18.36(b)–(i).[27]

Considering the feedback from State transportation departments and LPAs and the findings from this study, the FHWA and State transportation department Local Programs Office staff should consider that some flexibility exists in the 23 CFR 637 regulations for the development and execution of QA plans and in the administration of LPA projects based on project risk. Given this flexibility, State transportation department can delegate QA responsibility to properly certified LPAs but still must retain overall responsibility for adequate oversight of LPA project delivery as the primary sub-recipients of Federal funds. FHWA must also play a role by periodically reviewing and monitoring the State oversight. It is suggested that the FHWA form a small committee of practitioners from FHWA, State transportation departments, ACEC, NACE, and APWA to identify potential flexibility in the regulations and to reassess how they can be applied to optimize the QA requirements for LPA projects, based on the nature of the project type or purpose and risks.

APPENDIX A. STATE TRANSPORTATION DEPARTMENT SURVEY

This appendix contains a series of images of the State transportation department survey form used in this study.

Construction QA on Federally Funded LPA Projects - DOT Survey

Application of appropriate and meaningful construction quality assurance by local public agencies (LPA) on federally-funded transportation projects has been cited as a serious concern by Congress, the Federal Highway Administration (FHWA), State Departments of Transportation (DOTs), LPA program applicants, and transportation interest groups. The recent NCHRP Synthesis 442 focused on identifying practices and performance measures used on federally-funded LPA transportation projects. In addition, studies by both AASHTO and the FHWA have found construction quality on LPA projects to be highly variable, and the quality and availability of records make it difficult to verify compliance. The findings of the studies also indicated that construction materials testing was often either not done or was undocumented, which raises questions regarding the level of quality and durability of the final constructed product.

For this reason, the FHWA has engaged the services of Hill International, Inc., to collect data from a number of state DOTs and LPAs on the current state-of-the-practice of construction quality assurance on LPA projects.

This survey is intended to gather information on the current practices, existing best practices, and challenges that agencies face in the construction of federally-funded LPA projects.

The questionnaire has a maximum of ## questions; however, it is possible that far fewer will require answers since each individual's responses will vary. You will be asked to complete these questions based upon your agency's experience with the LPA program. A preliminary beta-test indicated that the survey should take anywhere between ## and ## minutes to complete, depending on the sequence of responses.

Please complete the questionnaire by Month ##, 2013.

If you have any questions about this survey, please contact:

Linda Konrath
Hill International, Inc.
Email: lindakonrath@hillintl.com
Phone: (215) 557-3272

DOT Respondent Contact Information

Please provide some basic contact information to facilitate any potential follow-up communications.

1. Contact Information

Name	
Agency name	
Position/Title	
Contact phone number	
Contact email	

Organizational Structure

The questions in this section relate to the organizational structure of the local public agency (LPA) program in your State.

2. Does your agency have a formal LPA program?

- ◯ Yes
- ◯ No

3. Who in your agency is generally responsible for overseeing the LPA program?

- ◯ Central office staff only
- ◯ Central office and District office staff
- ◯ District office staff only
- ◯ Not sure
- ◯ Other (please specify)

4. Does your agency have an LPA certification process? (If no, you may skip to Question 6)

- ◯ Yes
- ◯ No
- ◯ Other (please specify)

5. Does your agency consider an LPA's QA capabilities or past QA program performance as part of its decision to certify an LPA?

- ◯ Yes
- ◯ No

Comments

6. Does your agency consider an LPA's QA program performance or past QA capabilities as part of its decision to award federal funds to a LPA project?

- ◯ Yes
- ◯ No

Other (please explain)

Oversight of LPA Compliance with QA Programs

The next series of questions relate to how LPAs conduct quality assurance when conducting a federally-funded transportation project and are designed to gather some information on the nature of LPA compliance with quality assurance regulations (23 CFR 637).

7. How does your agency assure the LPA is complying with QA standards and specifications for Federal-aid projects? (check all that apply)

- [ ] Construction and administrative checklist
- [ ] Verification testing
- [ ] Periodic onsite field inspections
- [ ] Periodic project reviews or audits by DOT and/or FHWA
- [ ] Other (Please provide a description)

8. Who within your agency performs QA oversight or inspections for items related to materials and construction on LPA projects? (Check all that apply)

- [ ] District Office materials staff
- [ ] District Office construction staff
- [ ] District Office maintenance staff
- [ ] Central Office materials staff
- [ ] Central Office construction staff
- [ ] Central Office specifications and estimates or design staff
- [ ] District Office LPA coordinator
- [ ] Central Office LPA coordinator
- [ ] Consultants
- [ ] MPO staff
- [ ] Other staff or entities (please describe)

9. Has your agency trained its internal staff members (or consultant representatives) on how to oversee the construction QA performed on locally administered Federal-aid projects?

◯ Yes

◯ No

Comments

10. Has your agency trained LPAs in your state (or their consultant representatives) on how to implement the QA standards and specifications for LPA administered Federal-aid projects?

◯ Yes

◯ No

Comments

11. Does your agency account for compliance with these QA standards and factor it in when estimating the overall cost of the LPA project?

◯ Yes

◯ No

12. Are the LPAs responsible for the additional funds to complete the necessary testing to comply with the QA standards?

◯ Yes

◯ No

◯ Other (please specify)

DOT Oversight Process for QA

The next set of questions deals with the DOT's oversight process and activities related to QA for federally-funded LPA projects.

13. Which of the following procedures or activities does your agency maintain or conduct? (Check all that apply)

- [ ] Process for conducting reviews or audits of LPA compliance with QA requirements
- [ ] Random verification testing of materials (separate from an IA program) that could or does encapture materials from LPA projects
- [ ] Master list of qualified or certified testers readily available to LPAs (e.g., posted online)
- [ ] Master list of qualified or accredited laboratories readily available to LPAs (e.g., posted online)
- [ ] Requirement that LPAs must select materials from the DOT Qualified Products list (QPL)
- [ ] Requirement that LPAs must use approved sources (e.g., quarries)
- [ ] None
- [ ] Other (please specify)

14. Does your agency allow LPAs to use their own specifications or standards for activities or items related to materials or construction QA?

- ◯ Yes
- ◯ No
- ◯ LPA specifications that were generated by the DOT

15. Does your agency's independent assurance (IA) program cover the LPA's testers and equipment on federally-funded LPA projects?

- ◯ Yes
- ◯ No

Comments

16. Does your agency use a system or project approach to IA?

- [ ] System Approach
- [ ] Project Approach

17. Does your agency use consultants for IA of LPA projects?

☐ Yes

☐ No

Comments

18. Do the LPAs develop their own IA programs that they use with their federally-funded projects?

◯ Yes

◯ No

Comments

Rating of Construction Oversight Effort

19. On a typical federally-funded LPA project, please characterize the nature of your level of effort for materials and construction inspection.

	No oversight	Desktop inspection	Windshield inspection	Cursory field inspection	Detailed field inspection	N/A
Routine periodic inspection on LPA project	○	○	○	○	○	○
Final inspection (for final acceptance) on LPA project	○	○	○	○	○	○
Project is on-NHS and on-SHS	○	○	○	○	○	○
Project is off-SHS on local roads	○	○	○	○	○	○

Comments

20. What level of construction inspection (prior to final acceptance) do you apply for each of the following project types?

	No oversight	Desktop inspection	Windshield inspection	Cursory field inspection	Detailed field inspection	N/A
Asphalt pavement (new construction or rehabilitation)	○	○	○	○	○	○
PCC pavement (new construction or rehabilitation)	○	○	○	○	○	○
Bridge (replacement or rehabilitation)	○	○	○	○	○	○
Earthwork (e.g., retaining walls)	○	○	○	○	○	○
Intersection improvement	○	○	○	○	○	○
Drainage structures	○	○	○	○	○	○
Streetscape	○	○	○	○	○	○
Scenic trail	○	○	○	○	○	○

Comments

Challenges and Successes with Materials and Construction QA in LPA Program

The following questions are intended to identify both the challenges and best practices associated with materials and construction QA in the context of your state's LPA program.

21. Past studies have identified the following issues related to the QA practices applied to federally-funded LPA projects. Please estimate how frequently such issues may have occurred on your federally-funded projects.

	Never	Seldom	Periodically	Regularly	N/A
Lack of, or not following, QA procedures or specifications	◯	◯	◯	◯	◯
Lack of documentation related to materials and construction in project files	◯	◯	◯	◯	◯
Qualified / certified materials testing personnel not documented	◯	◯	◯	◯	◯
Improper or lacking materials certification	◯	◯	◯	◯	◯
Lack of or insufficient materials sampling frequency	◯	◯	◯	◯	◯
Insufficient inspection frequency, number of inspections, or inspection detail	◯	◯	◯	◯	◯
Acceptance of failed materials	◯	◯	◯	◯	◯
QC/QA not done on Force Account projects	◯	◯	◯	◯	◯
Other	◯	◯	◯	◯	◯

Comments

22. Given your responses to Question 19, please estimate the impact associated with the identified QA issues. For the purpose of this question, the impact is intended to capture the consequences of not meeting quality and could be measured in terms of increasing a project's cost, prolonging the project's schedule, and/or resulting in a potential reduction in service life.

	Minimal	Minor	Moderate	Significant	N/A
Lack of, or not following, QA procedures or specifications	◯	◯	◯	◯	◯
Lack of documentation related to materials and construction in project files	◯	◯	◯	◯	◯
Qualified / certified materials testing personnel not documented	◯	◯	◯	◯	◯
Improper or lacking materials certification	◯	◯	◯	◯	◯
Lack of or insufficient materials sampling frequency	◯	◯	◯	◯	◯
Insufficient inspection frequency, number of inspections, or inspection detail	◯	◯	◯	◯	◯
Acceptance of failed materials	◯	◯	◯	◯	◯
QC/QA not done on Force Account projects	◯	◯	◯	◯	◯
Other	◯	◯	◯	◯	◯

Other (please specify)

23. Does your agency employ any practices that have successfully been applied to mitigate challenges with QA in LPA projects? (If no, you may skip to Question 22)

◯ Yes (please describe below)

◯ No

Examples of successful practices to address challenges

24. To what extent do these successful practices mitigate any challenges associated with materials and construction QA on LPA-administered projects?

- ◯ Little to no mitigation of challenges or instances of non-compliance
- ◯ Moderate mitigation of challenges or instances of non-compliance
- ◯ Significant reduction of challenges or instances of non-compliance
- ◯ N/A

Comments

25. Does your agency prepare the materials sampling and testing schedule for a LPA-administered Federal-aid project?

- ◯ Yes
- ◯ No

Comments

26. Does your agency review the materials sampling and testing schedule prepared for a LPA-led project?

- ◯ Yes
- ◯ No

Comments

Provide LPA contacts in your State

Your help is requested to gather more in-depth information on the success you are having with the LPAs delivering federally-funded projects in your state.

Please identify up to six (6) LPA contacts in your State who have delivered federally-funded transportation projects QA.

Consider providing examples from small, medium, and large LPAs.

The LPA contacts you provide will be invited to participate in a brief survey that will enhance the findings from this survey.

27. Small LPA

LPA Contact Name	
Affiliation	
Phone	
EMail address	
.	
LPA Contact Name	
Affiliation	
Phone	
EMail address	

28. Medium LPA

LPA Contact Name	
Affiliation	
Phone	
EMail address	
.	
LPA Contact Name	
Affiliation	
Phone	
EMail address	

29. Large LPA

LPA Contact Name	
Affiliation	
Phone	
EMail address	
.	
LPA Contact Name	
Affiliation	
Phone	
EMail address	

End of Survey

Thank you for your willingness to participate in this QA for Federally-Funded LPA Projects survey. The survey is now complete. All responses will be kept anonymous.

APPENDIX B. LPA SURVEY

This appendix contains a series of images of the LPA survey form used in this study.

Construction QA on Federally-Funded LPA Projects - LPA Survey

Application of appropriate and meaningful construction quality assurance by local public agencies (LPA) on federally-funded transportation projects has been cited as a serious concern by Congress, the Federal Highway Administration (FHWA), State highway agencies(SHAs), LPA program applicants, and transportation interest groups. The recent NCHRP Synthesis 442 focused on identifying practices and performance measures used on federally-funded LPA transportation projects. In addition, studies by both AASHTO and the FHWA have found construction quality on LPA projects to be highly variable, and the quality and availability of records make it difficult to verify compliance with federal requirements. The findings of the studies also indicated that construction materials testing was often either not done or was undocumented, which raises questions regarding the level of quality and durability of the final constructed product.

For this reason, the FHWA has engaged the services of Hill International, Inc., to collect data from a number of SHAs and LPAs on the current state-of-the-practice of construction quality assurance on LPA projects.

This survey is intended to gather information on the current practices, existing best practices, and challenges that agencies face in the construction of federally-funded LPA projects.

The questionnaire has a maximum of ## questions; however, it is possible that far fewer will require answers as each individual's responses will vary. You will be asked to complete these questions based upon your agency's experience with the LPA program. A preliminary beta-test indicated that the survey should take anywhere between ## and ## minutes to complete, depending on the sequence of responses.

Please complete the questionnaire by Month ##, 2013.

If you have any questions about this survey, please contact:

Linda Konrath
Hill International, Inc.
Email: lindakonrath@hillintl.com
Phone: (215) 557-3272

LPA Respondent Contact Information

Please provide some basic contact information to facilitate any potential follow-up communications.

1. Contact Information

Name	
Agency name	
Position/Title	
Contact phone number	
Contact email	

Program Structure

The questions in this section relate to the program structure of your agency and experience with federally-funded LPA projects.

2. What is the size of your construction program over a typical year?

- ◯ < $100,000
- ◯ Between $100,000 and $500,000
- ◯ Between $500,000 and $1,000,000
- ◯ Between $1,000,000 and $10,000,000
- ◯ > $10,000,000

3. Please estimate what percentage of your construction program is performed using Federal-aid funds (based on the past 3 years).

- ◯ Between 0% and 30%
- ◯ Between 30% and 60%
- ◯ More than 60%

4. What project elements are typically included on your agency's Federal-aid projects ? (Check all that apply)

- ☐ Asphalt pavement (new construction or rehabilitation)
- ☐ PCC pavement (new construction or rehabilitation)
- ☐ Bridge (replacement or rehabilitation)
- ☐ Earthwork (e.g., retaining walls)
- ☐ Intersection improvement
- ☐ Drainage structures
- ☐ Streetscape
- ☐ Scenic trail
- ☐ Other

Comments

5. Please estimate the percentage of project funds that are typically allocated to construction inspection and quality assurance testing.

6. Have you ever been audited or reviewed by the State highway agency or the Federal Highway Administration?

- ◯ Yes
- ◯ No
- ◯ I don't know

Comments

7. Please identify how often your Federal-aid projects have experienced premature failure (i.e., within a year or two of construction) or required unanticipated maintenance.

- ◯ Never
- ◯ Once
- ◯ Occasionally
- ◯ Frequently
- ◯ N/A

Comments

Activities Related to Quality Assurance

The next set of questions are designed to provide some information on how QA activities are conducted by your agency and in conjunction with the State highway agency.

8. Does your agency have written QA program guidelines or QA procedures?

- ◯ Yes
- ◯ No
- ◯ I don't know

If yes, would you be willing to share your documents?

9. Do you use in-house staff for materials sampling and testing (e.g., through the Public Works Department or Engineering Unit)? If no, you may skip to Question 14.

- ◯ Yes
- ◯ No

10. Is your in-house staff qualified or certified through NICET, ACI, the State highway agency, or other certifying agencies?

- ◯ Yes
- ◯ No
- ◯ I don't know

If yes, please list examples of certifications of your staff

11. Does your staff receive any training related to construction quality assurance?

- ◯ Yes
- ◯ No
- ◯ I don't know

Comments

12. Do you perform materials testing in-house? If no, you may skip to Question 14.

- ◯ Yes
- ◯ No

13. What type of program do you use to qualify or certify in-house staff and laboratories?

- [ ] State Qualification Program
- [ ] AASHTO AMRL
- [ ] I don't know
- [ ] Other (please specify)

14. Does your agency retain Consultants to perform QA activities on federally-funded projects? (If no, you may skip to Question 18)

- ◯ Yes
- ◯ No

15. Typically, what percentage of project funds are set aside for hiring the Consulting firm to perform the project's QA activities?

16. What type of program do you use to qualify or accredit consultant laboratories?

- [ ] State Qualification Program
- [ ] AASHTO AMRL
- [ ] I don't know
- [ ] Other (please specify)

17. Do you require the Consultants to be qualified or certified (e.g., NICET, ACI, etc.)?

- ◯ Yes
- ◯ No
- ◯ I don't know

Comments

18. How do you determine a project's materials sampling and testing needs? (Check all that apply)

- [ ] Default to State standards
- [ ] Project scope, size, or complexity
- [ ] Project cost
- [ ] Type of funding (federal vs. state vs. local))
- [ ] Level of public interest
- [ ] Availability of in-house staff
- [ ] N/A

Other (please specify)

19. Who performs independent assurance activities on a federally-funded LPA project? (Check all that apply)

- [ ] Your agency
- [ ] State highway agency
- [ ] Consultant firm hired by State highway agency
- [ ] Consultant firm hired by your agency
- [ ] None performed
- [ ] A combination of: < fill in >

20. Please identify on what construction phase QA activities your agency coordinates with the State highway agency?

- [ ] Materials sampling and testing
- [ ] Inspection
- [ ] Independent Assurance
- [ ] Final acceptance
- [ ] Training
- [ ] Other (please identify)

21. Please the characterize the nature of the State highway agency's involvement in materials and construction inspections on your Federal-aid projects.

- ○ No involvement (Final Acceptance not signed by State)
- ○ Minimal involvement (signed Final Acceptance but did not do Final Inspection)
- ○ Low involvement (attended Final Inspection only, accompanied by 1 or 2 windshield inspections)
- ○ Moderate involvement (completed 1 interim on-site project inspection and attended final inspection)
- ○ Major involvement (conducted multiple on-site project inspections and attended final inspection)

Comments

22. What acceptance criteria does your agency use, i.e., does your agency have its own criteria or do you follow the State highway agency's criteria and thresholds?

- [ ] Our own criteria
- [ ] State highway agency criteria
- [ ] A combination of both our own criteria and the State highway agency's criteria and thresholds
- [ ] N/A

Comments

Rating of Construction Oversight Effort

23. What level of MATERIALS TESTING do you typically apply for each of the following project types?

	N/A	No testing	Use Contractor's test data	Sample once per project at the end for acceptance	Sample once per production day during entire project
Asphalt pavement (new construction or rehabilitation)	◯	◯	◯	◯	◯
PCC pavement (new construction or rehabilitation)	◯	◯	◯	◯	◯
Bridge (replacement or rehabilitation)	◯	◯	◯	◯	◯
Earthwork (e.g., retaining walls)	◯	◯	◯	◯	◯
Intersection improvement	◯	◯	◯	◯	◯
Drainage structures	◯	◯	◯	◯	◯
Streetscape	◯	◯	◯	◯	◯
Scenic trail	◯	◯	◯	◯	◯

Comments

24. What level of CONSTRUCTION INSPECTION (prior to final acceptance) do you apply for each of the following project types?

	N/A	No oversight	Desktop inspection	Windshield inspection	Cursory field inspection	Detailed field inspection
Asphalt pavement (new construction or rehabilitation)	◯	◯	◯	◯	◯	◯
PCC pavement (new construction or rehabilitation)	◯	◯	◯	◯	◯	◯
Bridge (replacement or rehabilitation)	◯	◯	◯	◯	◯	◯
Earthwork (e.g., retaining walls)	◯	◯	◯	◯	◯	◯
Intersection improvement	◯	◯	◯	◯	◯	◯
Drainage structures	◯	◯	◯	◯	◯	◯
Streetscape	◯	◯	◯	◯	◯	◯
Scenic trail	◯	◯	◯	◯	◯	◯

Comments

Best Practices

The following questions are intended to identify needs and best practices with respect to materials and construction QA from the perspective of Local Public Agencies.

25. In your opinion, what types of tools could help your agency or other local agencies successfully perform materials QA and construction inspections on federally-funded projects? (Check all that apply)

- ☐ Dedicated contact at the State highway agency
- ☐ Use of our agency's own specifications
- ☐ An LPA-specific construction manual produced by the State highway agency
- ☐ Industry support (such as through NAPA, ACPA, APWA, etc.)
- ☐ LTAP or National Highway Institute training that is focused on current issues
- ☐ FHWA web videos such as at www.fhwa.dot.gov/federal-aidessentials

Other (please specify)

26. Does your agency employ any practices that have successfully been applied to mitigate challenges with QA in LPA projects?

- ◯ Yes (please describe below)
- ◯ No

Examples of successful practices to address challenges

End of Survey

Thank you for your willingness to participate in this QA for Federally-Funded LPA Projects survey. The survey is now complete. All responses will be kept anonymous.

APPENDIX C. STATE TRANSPORTATION DEPARTMENT INTERVIEW FORM

This appendix contains a series of images of the State transportation department interview form used in this study.

Analysis of Construction QA Procedures on Locally Administered Federal-Aid Projects
FHWA DTFH61-12-C-00028
Interview Form – DOT

State:
Contact Information:
Review Team:
Date:

Discussion Point	Objective
A. General Information	Understand organizational structure of the LPA Program from agency perspective Understand how QA for LPA federal-aid projects are managed Identify QA guidelines for LPA projects Identify how LPA projects are classified

Discussion Topics:

1. Administration of LPA Program (Central Office, District, Other):
   - Does your agency have dedicated LPA coordinator/staff?
   - If so, what are responsibilities of the LPA coordinator?
2. DOT guidelines/manuals addressing QA for LPA projects
   - Does your agency have specific guidance for QA oversight of LPA federal-aid projects?
   - If not, how does the agency ensure that QA requirements for LPA federal-aid projects are met? (QA manuals/guidelines for state projects, other)?
3. Classification of LPA programs
   - Do you classify LPAs by size or project type?
   - Do QA for LPA requirements vary based on the project type/classification?

Responses:

1.
2.

Analysis of Construction QA Procedures on Locally Administered Federal-Aid Projects	
Discussion Point	**Objective**
B. Compliance with QA requirements for federal-aid	To understand how DOTs assure that LPAs comply with QA regulations for federal-aid projects per 23 CFR 637
Discussion Topics: 1. What processes are used by your agency to ensure that LPA federal-aid project construction/materials QA requirements are in compliance with 23 CFR 637 requirements? 2. How does your agency assure that LPAs are complying with QA standards & specifications? 3. Who performs QA oversight (Central office, District, Consultant, Other)? 4. Is training provided for DOT staff on QA oversight for LPA projects? 5. Does your agency allow LPAs to use their own specifications or standards for materials or construction QA? 6. Does agency IA program cover LPA staff and equipment? 7. Does QA compliance vary based on LPA project type?	
Responses: 1. 2.	

Analysis of Construction QA Procedures on Locally Administered Federal-Aid Projects	
Discussion Point	Objective
C. QA Qualification and Certification Requirements	To understand how DOT qualification and certification requirements for LPA federal-aid projects

Discussion Topics:

1. Does your agency have a certification process for LPAs?
2. Are there specific certification/qualification requirements for LPA laboratories (i.e. AAP, CMEC), or staff qualifications (technician training, qualification/certifications, experience, other)?
3. Does your agency maintain master lists of certified/qualified testers readily available to LPAs (online)?
4. Does your agency maintain list of qualified or accredited laboratories readily available to LPAs (online)
5. Is there a requirement that LPAs must select materials from the DOT qualified products list (QPL)?
6. Are QA certification training programs provided for LPA staff/technicians or consultants)?
    a. NICET, NETTCP, WAQTC, North Central Multi-regional training and certification, other
7. Is past QA performance by LPAs considered when certifying or re-certifying or awarding federal-funds?
8. Does agency allow self-certification of LPAs?
9. Are there different levels of certification based on LPA project types/classifications?
10. Does your agency use a systems approach or project approach to QA for LPAs?
11. Does your agency use consultants for IA on LPA projects?

Responses:

1.
2.

Analysis of Construction QA Procedures on Locally Administered Federal-Aid Projects	
Discussion Point	Objective
D. LPAs & Project Types	To understand how your agency classifies different LPAs within the state and what project types/classifications are associated with these different LPAs

Discussion Topics:

1) How does your agency classify LPAs? (population, size of program, or other)_____
2) What LPA project types are typically associated with these different LPAs in your state?

LPA federal-aid Project types could be characterized as high priority (i.e. on-SHS or NHS), part of a national (enhancement, accessibility, safety or air quality improvement) program or lower priority off-SHS or NHS. The following list covers typical LPA/DOT improvement programs:

1. Surface Transportation Enhancement Projects (generally minor $150k-$1M)
    a. Streetscapes, Pedestrian Facilities, Historic Trails, Landscape Enhancements, Cross-walks, Bicycle Lanes
2. LPA or MPO (County, City) Transportation Improvement Program (TIP) Projects as Part of STIP (minor to major projects)
    a. Highway, Bridge, Bicycle, Pedestrian, Safety, ADA, Transportation Enhancements
3. Safety (SRTS, HSIP, etc.)
4. Other High Priority Projects (ARRA)

Within these programs, do your LPA project types include:

☐ Minor Roadway Surface Improvements (Seal Coat, Friction Course, Thin Overlays – *may include Guard Rail, Safety Upgrades, and minor bridge work, i.e., surface patching etc.*

☐ Off-SHS/NHS Rehabilitation – Patch, Level, Structural and Non Structural Overlays – *may include Shoulder upgrades, Guard Rail Replace and other Safety Upgrades, and minor bridge work (i.e., surface patching etc.)*

☐ Major Rehabilitation – *Pavement Rehabilitation, Safety Improvements, Shoulder upgrades, Bridge deck replacement, Bridge safety upgrades, Drainage improvements, etc.*

☐ Major Rehabilitation – Limited Access (SHS or NHS) – Same as Rehabilitation + Corridor Issues, i.e., overpass clearance.

☐ Major Bridge replacement.

LPA projects might also include a variety of work ancillary to DOT projects. Do these include:

☐ Recreational Trails (or Bike Trails/Lanes)

☐ Pedestrian facilities, sidewalks, ADA compliant walkways, cross-walks etc.

☐ Intersection or other safety improvements,

☐ Streetscapes,

☐ Other_____

Analysis of Construction QA Procedures on Locally Administered Federal-Aid Projects	
Discussion Point	Objective

Analysis of Construction QA Procedures on Locally Administered Federal-Aid Projects	
Discussion Point	Objective
E. Level of QA Oversight Effort	Level of effort typically used for materials and construction QA oversight inspection for different LPA project types **On v. Off SHS or On v Off NHS**
Discussion Topics: Indicate generally the level of inspection used periodically during construction (C) and at final acceptance (A)	

Project Types	Level of Effort				
	No Oversight	Desktop Oversight	Windshield Inspection	Cursory Field Inspection	Detailed Field Inspection
Minor (off-SHS/NHS):					
Recreational Trails (or Bike Trails)					
Recreational facilities upgrades					
Pedestrian Facilities (ADA, sidewalks, walkways, crosswalks)					
Intersection safety or other safety improvements					
Minor Roadway Surface Improvement					
Streetscapes					
Major (on-SHS/NHS):					
Pavement Rehabilitation					
Intersection Improvement					

Analysis of Construction QA Procedures on Locally Administered Federal-Aid Projects					
Discussion Point	Objective				
Bridge Deck Replacement					
Bridge Rehabilitation					
Other					
Other					

Analysis of Construction QA Procedures on Locally Administered Federal-Aid Projects					
Discussion Point	Objective				
F. Level of QA Oversight Effort	Level of Materials Testing the DOT would expect to see for verification testing (for acceptance) given the different LPA project types				
Discussion Topics: Indicate generally the level of testing either during construction (C) or at final acceptance (A)					
Project Types	Level of Effort				
	No Testing	Contractor's Test Results	Once per project (at end for acceptance)	Once per production day during project	Multiple tests per lot for statistically-based QA
Minor (off-SHS/NHS):					
Recreational Trails (or Bike Trails)					
Recreational facilities upgrades					
Pedestrian Facilities (ADA, sidewalks, walkways, crosswalks)					
Intersection safety or other safety improvements					
Minor Roadway Surface Improvement					

Analysis of Construction QA Procedures on Locally Administered Federal-Aid Projects					
Discussion Point	Objective				
Streetscapes					
Major (on-SHS/NHS):					
Pavement Rehabilitation					
Intersection Improvement					
Bridge Deck Replacement					
Bridge Rehabilitation					
Other					
Other					

Analysis of Construction QA Procedures on Locally Administered Federal-Aid Projects				
Discussion Point	Objective			
G. Challenges with QA for LPA programs *Some commonly cited issues are provided (from process reviews and reports) but is not an exhaustive list. Please add or subtract from the list as appropriate based on your experience.*	To identify the frequency that issues related to QA practices have occurred on your federally-funded LPA Projects			
Project Type/ Category:	Level of Complexity:			
ISSUE	1- NEVER	2- SELDOM	3-PERIODICALLY	4-REGULARLY
Lack of or not following QA procedures or Specifications				
Lack of Documentation related to Materials or Constructio9n in Project Files				
No Documented Materials Testing Personnel				
Improper/lacking Materials Certifications				
Lack of or Insufficient Materials Sampling Frequency				
Insufficient Inspection Frequency, number of inspections, or inspection detail				

Analysis of Construction QA Procedures on Locally Administered Federal-Aid Projects				
Discussion Point	Objective			
Acceptance of Failed Materials				
QC/QA not performed on Force Account Projects				
Other				

Note: Use an additional sheet for each project type

Analysis of Construction QA Procedures on Locally Administered Federal-Aid Projects				
Discussion Point	Objective			
H. Challenges with QA for LPA programs *Some commonly cited issues are provided (from process reviews and reports. Please add or subtract from the list as appropriate* Project Type:	To identify the level of impact that the issues related to QA practices have caused on your federally-funded LPA Projects *Note that impacts are intended to capture consequences of not meeting quality and could be measured in terms of increased cost (construction or maintenance), extended project duration, reduced service life, loss of federal funding, etc..*			
ISSUE	1-MINIMAL	2-MINOR	3-MODERATE	4-SIGNIFICANT
Lack of or not following QA procedures or Specifications				
Lack of Documentation related to Materials or Construction in Project Files				
No Documented Materials Testing Personnel				
Improper/lacking Materials Certifications				
Lack of or Insufficient Materials Sampling Frequency				
Insufficient Inspection Frequency, number of inspections, or inspection detail				
Acceptance of Failed Materials				
QC/QA not performed on Force Account Projects				
Other				

Note: Use an additional sheet for each project type

Analysis of Construction QA Procedures on Locally Administered Federal-Aid Projects	
Discussion Point	Objective
I. Practices that Mitigate Issues related to QA for LPA Projects	To understand what successful or Best Practices have been implemented to improve the QA process for federally-funded LPA Projects

Discussion Topics:

1. Does your agency employ any practices or tools that have improved the QA oversight of or mitigated the cited issues associated with materials and construction QA for federally-funded LPA projects? If yes, please describe below:

Responses:

Example(s) of successful practices or tools that address specific challenges. Check any of the examples provided and add others:

- ☐ Dedicated resources at DOT
- ☐ DOT IA of LPA projects
- ☐ DOT QA training for QA oversight staff
- ☐ Standard procedures for addressing deficiencies found during QA inspection/testing
- ☐ LPA-specific guidance for construction/materials QA inspection and testing)
- ☐ Construction checklists
- ☐ Less stringent materials and construction specifications tailored to LPA project types
- ☐ Other

(Describe a project, work type/element, best practice or tools, and the specific issue or issues addressed. Provide enough level of detail to describe in a case study format.)

2. For the examples provided, to what extent did the successful practices mitigate the issues raised above?

A. Successful Practice _____resulted in:

- ☐ Minor mitigation of issue(s)
- ☐ Moderate Mitigation of issue(s)
- ☐ Significant reduction in frequency or impact of issue(s)
- ☐ N/A

APPENDIX D. LPA INTERVIEW FORM

This appendix contains a series of images of the LPA interview form used in this study.

Analysis of Construction QA Procedures on Locally Administered Federal-Aid Projects FHWA DTFH61-12-C-00028 Interview Form – LPA Agency: Contact Information: Review Team: Date:	
Discussion Point	Objective
A. General Information	Understand organizational structure of the LPA Program Understand scope of federal-aid projects and funding (as % of total program) Identify % of funding allocated to QA
Discussion Topics: 1. Size of annual construction program ($/year) 2. Percentage of federal-aid funds ($/total program $) 3. Percentage of funds allocated to construction inspection and materials QA	
Responses: 1. 2. 3.	

Analysis of Construction QA Procedures on Locally Administered Federal-Aid Projects	
Discussion Point	Objective
B. Program & Project Types	To understand how your local agency classifies different programs and project elements typically included in federal-aid projects

Discussion Topics:

1. What programs are typically associated with your agency? (i.e. Program types could be characterized as general surface transportation enhancements, high priority (i.e. NHS), or part of a national (safety enhancement, accessibility, air quality improvement) program.
2. The following list covers typical project elements or improvement projects. (Provide a separate listing of project type if appropriate) Rate these in terms of project complexity and cost (i.e. low, medium, high):

☐ Minor Surface Improvement (Seal Coat, Friction Course. etc.) – *usually no other items of work will accompany this project.*

☐ Surface Improvement – Thin Overlays – *may include Guide Rail Replace and other Safety Upgrades, and minor bridge work, i.e., surface patching etc.*

☐ Pavement Rehabilitation – Patch, Level, *Structural and Non Structural* Overlays – Off NHS – *Shoulder upgrades, Guide Rail Replace and other Safety Upgrades, and minor bridge work, i.e., surface patching etc.*

☐ Major Rehabilitation (NHS) – *Pavement Rehabilitation, Safety Improvements, Shoulder upgrades, Bridge deck replacement, bridge safety upgrades, Drainage improvements, etc.*

☐ Major Rehabilitation – Limited Access (NHS) – Same as Rehabilitation + Corridor Issues, i.e., overpass clearance.

☐ Bridge replacement

Project elements might also include a variety of work not normal or ancillary to DOT projects. These include:

☐ Recreational Trails (or Bike Trails) upgrades or new construction usually at abandoned railroad tracks,

☐ Recreational facilities upgrades, such roadways and parking lots,

☐ intersection or other safety improvements,

☐ ADA compliant sidewalks and walkways (curb cut ramps),

☐ Streetscapes,

☐ Other_____

Responses:

1.

2.

3.

Analysis of Construction QA Procedures on Locally Administered Federal-Aid Projects	
Discussion Point	Objective
C. QA Processes and Requirements	To understand allocation of staff and resources to QA activities, training and certification requirements for staff, and how QA requirements for a federally-funded project are determined

Discussion Topics:

1. Does your agency have QA program guidelines, specifications or standards for materials & construction QA? If not, do you rely on DOT guidance and standards or other?
2. How do you determine a project's QA requirements (i.e. sampling, testing and inspection requirements)? (i.e. DOT standards, internal standards, project scope, cost, etc.)
3. Do you use in-house staff for construction and materials QA?
4. Are your staff QA certified or qualified and are training programs available for your staff related to QA certification (i.e. NICET, NETTCP, WAQTC, North Central Multi-regional training and certification, or other DOT programs)?
5. Do you perform materials testing in-house or use outside laboratories? Are there specific certification requirements for your laboratories (i.e. AAP, CMEC), and technician training, qualification/certifications, experience, or other)?
6. Do you use consultants for construction QA activities? If so, is QA certification or qualification a requirement for consultants?
7. What role does the DOT have in QA activities?
8. Do you coordinate with the DOT on QA activities; if so, what activities (e.g. lab checks, testing, assurance, etc.)?
9. Who performs Independent Assurance (IA) activities on federally-funded projects?
10. Do QA requirements for inspection and acceptance vary based on project type and how are acceptance criteria established (i.e. internal criteria, DOT criteria, combination, other)?

Responses:

1.
2.
3.

Analysis of Construction QA Procedures on Locally Administered Federal-Aid Projects					
Discussion Point	Objective				
D. Level of QA Oversight Effort	Understand levels of Materials Testing typically used for different LPA project types				
Discussion Topics: Indicate generally the level of testing during construction (C) or at final acceptance (A)					
Project Types	Level of Effort				
	No Testing	Contractor's Test Results	Once per project (at end for acceptance)	Once per production day during project	Multiple tests per lot for statistically-based QA
Recreational Trails (or Bike Trails) upgrades					
Recreational facilities upgrades					
Minor Surface Improvement					
Surface Improvement					
Streetscapes					
ADA compliant sidewalks and walkways (curb cut ramps)					
Intersection safety improvements					
Pavement Rehabilitation					
Bridge replacement					
Major Rehabilitation (NHS)					
Major Rehabilitation (limited Access NHS)					
Other					
Other					

Analysis of Construction QA Procedures on Locally Administered Federal-Aid Projects					
Discussion Point	Objective				
E. Level of QA Oversight Effort	Level of effort typically used for materials and construction inspection for different LPA project types				
Discussion Topics: Indicate generally the level of inspection used periodically during construction (C) and at final acceptance (A)					
Project Types	Level of Effort				
	No Oversight	Desktop Oversight	Windshield Inspection	Cursory Field Inspection	Detailed Field Inspection
Recreational Trails (or Bike Trails) upgrades					
Recreational facilities upgrades					
ADA compliant sidewalks and walkways (curb cut ramps)					
intersection safety improvements					
Minor Surface Improvement					
Surface Improvement					
Streetscapes					
Pavement Rehabilitation					
Bridge replacement					
Major Rehabilitation (NHS)					
Major Rehabilitation (limited Access NHS)					
Other					

Analysis of Construction QA Procedures on Locally Administered Federal-Aid Projects	
Discussion Point	Objective
H. Practices that Mitigate Issues related to QA for LPA Projects	To understand what successful or Best Practices have been implemented to improve the QA process for federally-funded Projects

Discussion Topics:

1. Does your agency employ any practices that have improved the QA oversight of or mitigated the cited issues associated with materials and construction QA for federally-funded LPA projects? If yes, please describe below:

Responses:

Example(s) of successful practices or tools that address specific challenges. Check any of the applicable examples provided and add others:

- ☐ Dedicated contact at DOT
- ☐ Use of consultants to allow more frequent inspection
- ☐ Use of local agency specifications tailored to project types
- ☐ Agency-specific construction/materials manual
- ☐ Formal tracking of materials certification, test results
- ☐ Industry support (NAPA, ACAP, APWA, other)
- ☐ Local agency-specific construction/materials manual
- ☐ Follow up procedure for addressing deficiencies
- ☐ DOT QA requirements tailored to project types
- ☐ LTAP, NHI, DOT or other QA training
- ☐ Constant pressure for periodic inspection
- ☐ FHWA support (federal-aid web video)
- ☐ Construction Checklists
- ☐ Other

(Describe the project, work type/element, best practice or tools, and the specific issue or issues addressed. Provide enough detail to develop in a case study format)

Analysis of Construction QA Procedures on Locally Administered Federal-Aid Projects	
Discussion Point	Objective

2. For the examples provided, to what extent did the successful practice/tools, if any, mitigate the issues raised above?

A. Successful Practice _____resulted in:

- ☐ Minor mitigation of issue(s)
- ☐ Moderate Mitigation of issue(s)
- ☐ Significant reduction in frequency or impact of issue(s)
- ☐ N/A

APPENDIX E. PROCESS REVIEW SUMMARY TABLE

This appendix contains table 12, which summarizes process reviews by State. It identifies the source of the report, the date, the key observations made from the report, and the recommended actions suggested in the report.

Table 12. Process review summary table.

State	Source	Written report or narrative email	Date of report (year)	Key observations related to LPA construction or materials QA	Recommended actions suggested
Arkansas	FHWA	ARRA report	2010	▪ LPA officials and consultants hired by LPAs have varying levels of knowledge and guidance needed for material sampling and testing requirements; documentation of pay quantities. ▪ Arkansas State Highway Transportation Department (AHTD) does not have an LPA manual (as of 2010).	▪ AHTD should develop LPA manual. ▪ Best Practice: One AHTD district provides CEI consultants with copy of required QC and QA testing frequencies and requirements. CEI firm then placed all supporting documentation (including material certifications) in a portfolio for each pay estimate submitted to AHTD.
Arizona	FHWA	Arizona Department of Transportation (ADOT) Self-Admin	2012	▪ ADOT's role in monitoring and overseeing LPA self-administered projects is limited, particularly once the project is in construction. On seven of the eight projects reviewed, no evidence of ADOT construction oversight was found ▪ On five of eight construction projects, the LPAs did not have daily logs that reported quality and quantity of materials. ▪ ADOT is currently in the process of rewriting the LPA manual, QA program manual, and recertification of LPAs.	▪ Suspend LPA self-administration program until report recommendations are implemented. ▪ Develop a more robust Self-Administration application and approval process. ▪ Provide training and guidance via manuals and improve coordination and communication.
Arizona	FHWA	Annual Construction Report (State Delegated Projects)	2012	This review dealt with construction administration issues, but there were a few findings related to this project, such as the following: ▪ Inspector diaries do not contain sufficient quantity backup information. ▪ Inconsistent records for work performed or materials permanently installed into Federal-aid projects. ▪ Incidents of failure to comply with Buy America provisions.	▪ ADOT should educate district engineers and construction staff on Buy America through training and by revision of LPA manual. ▪ ADOT should evaluate required frequency of inspector training on inspector diary documentation, including development of a refresher course for certified

State	Source	Written report or narrative email	Date of report (year)	Key observations related to LPA construction or materials QA	Recommended actions suggested
					inspectors.
California	FHWA	Joint Process Review on QAP	2007	In general, the report noted that "sampling, testing, and IA efforts on local agency projects (on and off the SHS) need improvement." Specific findings included the following: ▪ Five of five LPAs reviewed were not keeping IA staff and laboratory/equipment separate from regular day-to-day acceptance testing. ▪ Four of five LPAs reviewed were not keeping project files updated and available for review at one central location. ▪ Five of five LPAs reviewed were not keeping log summary testing frequency information available upon request. ▪ Two of five LPAs reviewed were not keeping certifications readily available.	▪ Caltrans should continue to conduct training on QA. ▪ Develop an online database for tester certification.
Colorado	FHWA	Local Agency Review of Contract Modification Orders (CMO) & Materials Testing Procedures and Documentation	2009	▪ This review dealt with a few items, most of which centered on contract administration, e.g., CMOs were unapproved or inadequately described. ▪ Seventy-five percent of LPAs did not follow requirements for materials testing, documentation, QA, or IA. ▪ Several projects were found to have nonconforming materials installed, inconsistent documentation levels (ranged from excellent to poor), and missing materials certifications; for example: ▪ LPA typically performs additional compaction testing on asphalt but other essential asphalt tests missing and minimum requirements of Field Materials Manual not followed.	▪ Better staffing by CDOT required for LPA projects. ▪ Increase training available to CDOT districts and LPAs. ▪ Improve oversight by CDOT staff through revision of the LPA manual. ▪ CDOT should develop the minimum materials sampling, testing, and inspection schedule for IA evaluation on all LPA projects. ▪ LPAs that prefer to manage the Federal-aid projects must provide a materials management plan for approval by CDOT's Regional Local Agency Coordinator. This LPA plan should be a one-time process to develop a flow chart or an outline of roles and responsibilities.
Delaware	FHWA	Narrative email	2012	Delaware Department of Transportation does not have an LPA program per se.	Not applicable.

State	Source	Written report or narrative email	Date of report (year)	Key observations related to LPA construction or materials QA	Recommended actions suggested
Delaware Valley Regional Planning Commission (DVRPC)	DVRPC and Pennsylvania Department of Transportation (PennDOT)	Narrative email	2012	DVRPC (the Metropolitan Planning Organization (MPO) in southeast Pennsylvania) administers LPA program on behalf of PennDOT in the southeast Pennsylvania district.	PennDOT needs to consolidate manuals for clarity on LPA projects.
Florida	FHWA	LAP Process Review	2007	▪ FDOT is not consistent in documenting any inspections done during the life of a LAP project (both on and off the SHS), and there are missing reports in the project files. ▪ The majority of QC activities and knowledge of local agency QC is inconsistent among the four districts. A similar trend exists in terms of the amount of FDOT materials certification testing; one district does not confirm certification testing, two other districts do, and the fourth district does it only for SHS projects. ▪ The level of IA reviews of local agencies and their consultants varies per district, from not performed to a moderate level of IA. ▪ There were trends identified that indicated inconsistencies among districts in terms of inspection of LAP construction projects. ▪ None of the LPAs perform their own verification testing and sampling; however, in some circumstances with smaller projects, a few agency project managers perform a minimum level of quality verification.	▪ FDOT should establish a consistent and effective QA process that would be incorporated district-wide. It is critical that FDOT Construction staff be part of this process, because they are for any routine State-administered projects. ▪ All QA reviews on any LAP projects done by FDOT staff should be documented and kept in the project file at FDOT, and FDOT should keep copies of LAP construction contract files at the LAP Administrator's office in the district.

State	Source	Written report or narrative email	Date of report (year)	Key observations related to LPA construction or materials QA	Recommended actions suggested
Florida	FHWA	Materials QA Review of FDOT	2009	▪ Nine of 10 local agencies used a version of FDOT specifications (2000, 2004, or 2007), either exclusively or combined with local specifications. ▪ Agencies that still used the 2000 specification cited that contractor QC was the primary reason for not making the change. Other local agencies indicated they are not able to make the transition to new specifications as quickly as FDOT releases them, or that they still use Marshall Mix asphalt. ▪ The oversight provided by local agencies for LAP projects varies from one agency to the next, depending on their in-house staff levels and experience. Some local agencies have either inadequate or inexperienced staff to manage transportation construction projects. ▪ The process of verification testing varied greatly among local agencies that conducted materials testing. The methodologies used depended on the specifications used for the projects, but in some cases, the contract specifications were not fully enforced.	▪ A procedure should be developed that would allow the LPA to verify the IA certification status of laboratories, technicians, and materials plants for LAP projects and notify FDOT when an IA check is required so FDOT can conduct it. ▪ Levels of oversight could be tiered depending on the scope of work, level of risk, and/or qualifications of the managing LPA for each project. ▪ The LAP manual should discuss requirements for agencies that do not use consultants for project management/ inspection services versus those that do. ▪ If FDOT desires to certify LPAs, then a more active role should be played to ensure that the consultants are satisfactorily providing the services they are hired to do.
Illinois	FHWA	Hot-Mix Asphalt (HMA) Quality Assurance (QA) Process Review	2012	▪ Reviewed one local project per district. ▪ Districts are not all treating investigative sampling and testing in the same way nor reporting test results on time. ▪ Past reviews found that the QA inspectors did not have required training for tasks involved.	▪ IDOT memorandum issued to require districts and LPAs to investigative sampling and testing and reporting QA test results within 10 days to the contractor. ▪ IDOT district 1 provides QA oversight on all LPA projects; it has a large program and manages good compliance.

State	Source	Written report or narrative email	Date of report (year)	Key observations related to LPA construction or materials QA	Recommended actions suggested
Indiana	FHWA	Assessment Report	2007?	▪ INDOT does not have an LPA guidance manual that outlines the administration and QC review requirements of the LPA project development and construction oversight process. ▪ INDOT's district Area Engineers (AE) are responsible for making weekly site inspections and ensuring that material testing is conducted or material samples are delivered to INDOT district staff. However, AE workload is often too high to conduct sufficient inspections. ▪ AE inspections are not currently documented. ▪ The district office certifies the testing results provided by the LPA consultant inspector, conducts asphalt material testing, and maintains the test records in the district office. ▪ The LPA or the LPA's consultant oversees the contractor and provides QA. Consultant inspectors must be qualified through INDOT's Qualified Technical Program. However, evidence of the qualification was generally not available in the project files. ▪ INDOT requires the LPA to administer and run QC, but INDOT has no overall QC monitoring program and organized record-keeping system in place to ensure that the LPA meets these requirements.	▪ INDOT should review and inspect LPA projects with sufficient frequency to verify that projects are constructed in accordance with contract requirements. ▪ INDOT should develop an LPA guidance manual, written for a broad audience of INDOT district and office staff, LPAs, MPOs, and consultants. The manual should clearly identify INDOT's stewardship and QC review oversight responsibilities. ▪ INDOT should consider establishing an electronic LPA question-and-answer system for staff to get real-time answers to issues that may arise. It could then serve as a basis for modifying and updating the LPA Guidance Manual.
Kansas	FHWA	Narrative email	2012	▪ Follow-up done in 2008. ▪ LPA projects are typically not large enough (material quantities) to justify a proper QC/QA program. ▪ Generally no QA test is obtained by LPAs independently from the contractor's consultant. ▪ Materials certification training is too expensive for LPAs to attend. ▪ LPA specifications all different from each other (and from that of KDOT). ▪ LPAs are not keeping current with KDOT's prequalified materials list.	KDOT purchases back Federal funds allocated to LPAs at a rate of 90 cents on the dollar, with the aim to de-federalize the LPA projects.

State	Source	Written report or narrative email	Date of report (year)	Key observations related to LPA construction or materials QA	Recommended actions suggested
Kentucky	FHWA	LPA process review	2009	▪ Kentucky Transportation Cabinet (KYTC) has limited staff to perform routine inspections. ▪ There is no defined process for determining when projects may be administered by the LPA without KYTC daily involvement. ▪ Some LPA sponsors (6 of 16) were not aware of the need to have a KYTC final inspection. ▪ Three LPA sponsors were unaware of whom to contact at KYTC for assistance. ▪ Many LPAs lacked an adequate QA and testing program. ▪ Limited amounts of test results and inspection documentation were found in any project files. Thirteen of 23 projects had sparse or no documentation. ▪ Projects lacked certified inspectors.	▪ Provide more guidance and training for the LPA. ▪ Increase oversight and interaction between FHWA, KYTC, and LPAs. ▪ KYTC should establish a documented monitoring process for LPA projects that identifies contacts, types of inspections, frequency of expected contact, and methods to document contact. ▪ KYTC should develop an acceptable level of testing, inspection, and documentation, and convey to LPAs. ▪ KYTC should develop guidelines for inspection of projects and minimum training or certification for inspection personnel. ▪ KYTC should develop a documented process for final project review and closeout.
Maine	FHWA	Construction Contract Modifications for LAP	2012	LPA certification course manual is too general for construction management.	MaineDOT should add emphasis on construction oversight section for construction managers.
Maryland	FHWA	LPA process review	2008	▪ Maryland Department of Transportation districts and LPAs are not aware of the construction manuals. ▪ No formal training for construction personnel is available. ▪ No materials certification or inspection reports were found on file for the projects reviewed.	▪ Update manuals and start training LPAs and State transportation department district personnel. ▪ Make guidance document for construction oversight of LPA projects. ▪ Need to consolidate manuals.
Minnesota	FHWA	LPA Process Review: Plans, Specifications, and Estimates (PS&E) Compliance	2011	Mn/DOT construction inspection form is outdated.	LPA liaison to develop suitable form for field reviews.
Missouri	FHWA	Narrative email	2012	There is nothing to date dealing with LPA and the construction phase.	Not applicable

State	Source	Written report or narrative email	Date of report (year)	Key observations related to LPA construction or materials QA	Recommended actions suggested
Missouri	FHWA	Joint FHWA/State transportation department Process Review	2009	▪ MoDOT relies on LPA self-certification and single audits performed by the State Auditor's Office for verification that the program is administered in accordance with Federal law. ▪ There is no centralized oversight function for areas such as construction. ▪ MoDOT's LPA manual is a great resource, but some LPAs found it difficult to use. ▪ Some LPAs and MoDOT staff are not completely familiar with design and construction contract requirements that are addressed in the LPA manual. ▪ LPA officials rely heavily on MoDOT to interpret project requirements and to conduct periodic and final inspections; but MoDOT district staff said workload often prevented them from conducting about half of the required inspections. ▪ Documentation was missing from project files. ▪ LPAs lacked understanding of Brooks Act requirements for procuring consultants.	▪ Assemble an LPA training team, develop training classes for MoDOT and LPAs, and deliver training annually. ▪ LPAs should be required to attend the training as a condition of receiving Federal funds. ▪ Consider using the LTAP to augment the annual training classes. ▪ Assemble a MoDOT/LPA QA team to perform annual project/process reviews in each district.

State	Source	Written report or narrative email	Date of report (year)	Key observations related to LPA construction or materials QA	Recommended actions suggested
Mississippi	FHWA	Joint FHWA/State transportation department Process Review	2006	▪ On four of six projects reviewed, no QA testing was performed. ▪ Three of six projects had missing QC reports or testing results.	▪ The State transportation department's *Project Development Manual* (PDM) for LPAs should stress the importance of materials certification and testing. ▪ The PDM should link to the Material Division's *Inspection, Testing, and Certification Manual*. ▪ The State transportation department should become more actively involved in the oversight of LPA projects. ▪ Provide more training on Material Certification/Testing procedures and better examples in the PDM.
Montana	FHWA	Community Transportation Enhancement Program Project Compliance Review	2008	LPAs rely on consultants but the consultants' knowledge on material requirements and documentation testing varies.	The State transportation department should create written guidance for district construction liaisons.
Nevada	FHWA	LPA Contract Admin Review	2011	▪ NDOT should improve frequency and depth of onsite inspections of LPA projects. ▪ NDOT should designate a lead LPA NDOT representative in each district and increase oversight of LPA projects during the construction phase.	▪ Review of Clark County's QA program planned for 2013. ▪ NDOT should develop LPA oversight requirements and indepth training on what LPAs' supervision role and monitoring documentation are. ▪ LPAs should attend LPA manual training.

State	Source	Written report or narrative email	Date of report (year)	Key observations related to LPA construction or materials QA	Recommended actions suggested
New Hampshire	FHWA	Review on LPA and Construction Administration	2010	▪ Contract administrators wirelessly connect to Construction Management System. ▪ Consultant inspectors are not keeping adequate project records. ▪ Review survey showed that QA/QC testing is being administered inconsistently.	▪ Construction Bureau should establish a review team to annually perform process reviews. ▪ Consultant inspectors required to use only approved preformatted field books, and Resident Engineer must sign the log book daily. ▪ NHDOT should review and approve the QA/QC testing procedures envisioned for each project commensurate with the level of complexity of the project. ▪ All new LPA projects are required to submit a materials testing and QA program plan as part of contract documents.
New Hampshire	FHWA	Joint FHWA/State transportation department Review of NHDOT's Oversight of LPA	2008	There is a lack of guidance/training on construction program management and quality inspection techniques.	▪ NHDOT should develop a comprehensive LPA manual that centralizes all of the information needed to administer Federal-aid programs, including construction oversight ▪ Consider implementing a certification/ qualification based program for LPAs ▪ Construction section of the manual should be expanded to address specific issues such as inspection procedures and requirements, documentation requirements, and materials and testing requirements. ▪ Manual should address project closeout procedures more thoroughly, including final inspection and final closeout paperwork.

State	Source	Written report or narrative email	Date of report (year)	Key observations related to LPA construction or materials QA	Recommended actions suggested
New York	FHWA	ARRA construction oversight report	2011	▪ Added QC/QA requirements and inspection staffing and recordkeeping should be implemented through the Construction Management Plan. ▪ Added inspection Manual for Uniform Record Keeping requirement. ▪ New York State Department of Transportation (NYSDOT) regional personnel are not aware of guidance for construction oversight and materials QA of LPA projects (although they were released agency-wide as memoranda). ▪ FHWA-NY Division working with NYSDOT on refining Federal Aid Locally Administered Project Manual; mandatory requirement to use the NYSDOT Standard Specification on all LPA projects (avoiding the host of confusion in interpreting and approving multiple Project Sponsor Specifications); mandating local project sponsors to create a Construction Management Plan to be approved at time of PS&E approval that clearly outlines construction QA roles and responsibilities for this project; extensive FHWA Division Office training on construction oversight of LAPs conducted across the State that included Local Project Sponsors over the past 3 years—NYSDOT Regional Local Project Liaisons, and many members from the consultant engineering community who provide both project management and construction inspection.	▪ Revised policies in NYSDOT Procedures for Locally Administered Federal-Aid Projects Manual (2012) chapters 4, 9, and 15. ▪ Construction oversight training around the State to NYSDOT, LPAs, and consultants.
North Dakota	FHWA	Narrative email	2012	Nothing that relates to LPA at the Division nor at the North Dakota Department of Transportation (NDDOT).	Not applicable
North Dakota	FHWA	Review of NDDOT Construction and Contract Administration on LAPs	2007	▪ NDDOT district personnel generally develop a list of materials certifications and a list of materials sampling and testing frequencies. ▪ Majority of projects had up-to-date construction documentation maintained in the project file. ▪ No “noteworthy examples of substandard construction quality items that could be specifically attributed to only LPA construction projects were witnessed.”	None

State	Source	Written report or narrative email	Date of report (year)	Key observations related to LPA construction or materials QA	Recommended actions suggested
Ohio	FHWA	Final Report: Construction Oversight of Local Programs Quality Improvement Review	2007	▪ General ODOT and LPA Processes: ▪ Each district within ODOT has a local program coordinator and one or more construction monitors. ▪ For each project, ODOT requires the district to complete a 13-point "Local Public Agency Local-Let Participation Requirement Review Form" to prequalify LPAs. Staffing, past performance, number of projects LPA currently oversees, fiscal responsibility, consultant use, and established project delivery and construction practices and processes in place are reviewed and evaluated to determine qualification. ▪ All LPAs use independent test laboratories to run sampling and testing programs. ▪ LPA's materials management process is required to be submitted to ODOT for review and acceptance. ▪ Unless otherwise accepted, LPA is required to use ODOT's certified materials suppliers and established job mix formulas. ▪ Districts are required to monitor LPA compliance with the project's materials management processes: once a month for projects valued at more than $2 million, four times per season for projects ranging from $500,000 to $2 million, and twice per season for projects less than or equal to $500,000. ▪ District staff monitors compliance with the accepted materials management process by reviewing project documentation at least once per month. ▪ Amount and level of district staff involvement with LPA is driven by the size, complexity, and experience of the LPA's staff and consultants. ▪ District office visits to LPA projects average once every 2 to 4 weeks. ▪ Process Review Findings: ▪ Forms were prepared for each project, but to varying degrees of completeness, particularly in the area of technical expertise needed for performing the various tasks related to project delivery. This was especially true for complex, nontypical construction projects or for LPAs that did not have an engineer on staff. ▪ Lack of follow-up by ODOT to ensure the LPA's pre-qualified staff does indeed deliver the project or	▪ ODOT needs to have documented acceptance of LPAs' processes for materials management. ▪ ODOT must ensure that LPA prequalified staff is delivering projects. ▪ ODOT should document how it reviews and accepts key personnel. ▪ All specifications subject to price adjustments must be monitored and enforced by ODOT. ▪ Consider developing a manual for construction monitors. (One ODOT district has already done this.) ▪ Provide training to ensure LPAs understand the need to provide and maintain organized documentation to support Federal reimbursement. ▪ Consider developing a list of minimum information for LPAs to include in daily diary reports.

State	Source	Written report or narrative email	Date of report (year)	Key observations related to LPA construction or materials QA	Recommended actions suggested
				whether that project responsibility is delegated to other staff ▪ There is a lack of documentation related to ODOT's acceptance of the LPA's materials management processes. ▪ ODOT does not provide training to the LPAs on a routine basis. ▪ Some projects had problems with the LPA staff qualifications. ▪ None of the districts formally accepted the LPAs' materials management process. ▪ Asphalt concrete specifications and their associated QA/QC provisions created the greatest challenges for LPAs. ▪ Project records could not confirm whether the LPAs effectively used materials test results. Records did not demonstrate if out-of-specification materials were rejected or accepted at reduced price. ▪ District usually attends project progress meetings. ▪ Most of the LPAs maintained daily diaries and filled out quantity sheets. ▪ Some examples of missing project documentation were found.	

State	Source	Written report or narrative email	Date of report (year)	Key observations related to LPA construction or materials QA	Recommended actions suggested
Oregon	Oregon DOT and FHWA	Conference call	12/5/12	▪ No formal FHWA audits of the Oregon program have been performed. ▪ LPAs are required to follow Oregon's construction manual, which contains rigorous recordkeeping requirements. ▪ Bulk of local projects are let by Oregon DOT. ▪ Subset of projects is administered by certified LPAs. ▪ Oregon DOT region assurance experts review 100 percent of the jobs. ▪ Oregon DOT construction liaisons visit LPA projects at least two or three times during the course of the project. More effort is put toward projects run by LPAs or consultants that are not as sophisticated or that have experienced problems in the past. ▪ Projects mostly relate to bridge, pedestrians, and trails. LPAs do paving projects on their own without Federal funds. ▪ Training for LPAs is available at a nominal price. ▪ Inspectors are required to be certified (written, oral, and hands-on testing. Annual recertification). Certification classes are available. ▪ Some of the larger LPAs do have qualified inspectors and materials testers. Others retain consultants.	None
Pennsylvania	FHWA	Report—IO of Local Acceptance of HMA	2006	One PennDOT district did not include acceptable verification or dispute resolution procedure on local projects.	▪ Develop standard specification for local acceptance of HMA (PennDOT). ▪ Need to consolidate relevant material from multiple (11) manuals that deal in some way with construction of LPA projects.
South Carolina	FHWA	FHWA process review	2008	▪ Inadequate documentation. ▪ Inadequate oversight. ▪ Self-certification by the LPA that it is qualified to administer a project is not sufficient to ensure that the LPA's organizational structure and in-place processes are adequate to carry out a Federal-aid project.	▪ The South Carolina Department of Transportation should develop a more objective certification system, with minimum standards for organizational structure and professional capabilities, and that requires periodic recertification. ▪ Consider establishing a unit with specific responsibility to manage the LPA program.

State	Source	Written report or narrative email	Date of report (year)	Key observations related to LPA construction or materials QA	Recommended actions suggested
South Dakota	FHWA	South Dakota Department of Transportation (SDDOT)/FHWA Local Government Assistance QIR	2007	▪ SDDOT oversight of County Bridge, County Road and Urban System Programs is satisfactory. ▪ Transportation Enhancement Program: ▪ Virtually no SDDOT oversight. ▪ No SDDOT inspection, including final inspection. ▪ No materials testing and acceptance reporting requirements ▪ Administration of materials testing and acceptance is delegated to the LPA with no oversight by SDDOT.	▪ SDDOT should develop a construction inspection oversight process for all projects. ▪ SDDOT should provide a final inspection on all projects. ▪ SDDOT should develop a material testing and acceptance oversight process for all projects.
Utah	FHWA	LPA Change Order Review	2011	▪ This review focused on change orders. ▪ UDOT Region 3 best practice noted with use of the C103 form: To address changes orders that require price justifications, a C103 form was created to provide more accurate estimate of materials, labor, and equipment, which gave a more developed cost analysis and itemized statement.	▪ Develop guidance and training for UDTO and LPA regarding change orders. ▪ UDOT should develop a standardized change order documentation approach.
Utah	FHWA	Joint FHWA/State transportation department process review	2008	▪ State employs a full-time employed State engineer to be in responsible charge of local government projects. ▪ In response to a 2006 Quality Improvement Team (QIT) review, UDOT piloted a local government certification program with one city. The program did not yield the expected results and was discontinued. ▪ UDOT developed a Local Government Guide in response to the 2006 QIT review. ▪ UDOT has developed a mandatory training and certification program to assist UDOT and consultants.	▪ Local government oversight manual should be developed to describe roles and responsibilities of the different agencies ▪ Standard CA Agreement should be reviewed and revised to clearly show who is responsible for administering what work and when.
Virginia	FHWA	LAP Process Review	2003	▪ Construction work is initialized prior to authorization. ▪ VDOT existing checklist barely mentions QA in the construction phase.	▪ Create LAP construction checklist. ▪ VDOT should increase monitoring of LAP construction phase.

State	Source	Written report or narrative email	Date of report (year)	Key observations related to LPA construction or materials QA	Recommended actions suggested
Virginia	FHWA	Materials QA Stewardship Review of VDOT	2006	▪ QA testing is done on 20 percent of lots (i.e., ratio of 1:5). ▪ Requires all testing done by certified technicians. ▪ Verification reports for HMA and cold mix asphalt are not being included in the final project files.	▪ Add VDOT specification for QC field tests for soils and concrete. ▪ VDOT should develop a procedure to ensure technicians periodically calibrate fresh concrete air meters. ▪ VDOT should review its current asphalt mix specification that allows retesting when failing test results are obtained because it results in a system that is biased toward the contractor.
Virginia	FHWA	Joint Process Review of LPA Federal-aid program	2008	Oversight of construction and materials acceptance testing is inconsistent across districts (sometimes within VDOT ROW only).	VDOT should create guidelines for inspection staffing, materials acceptance, and assurance testing. The materials acceptance portion should include testing frequency, documentation, and staffing levels.
Virginia	FHWA	ARRA report	2010	▪ LPAs are required to do QA testing of contractors' test results done on one to five basis (20 percent). ▪ Review noted lack of independent QA testing. ▪ VDOT has local construction manager located in each district involved in assisting LPAs during project construction.	▪ Verification testing and sampling to be included in VDOT's compliance assessment checklist. ▪ VDOT provided guidance to LPAs through additional emphasis on materials QA in chapter 13 of LAP manual.
Washington	FHWA	WSDOT Quality Assurance Stewardship Review	2011	▪ Procedures to generate random numbers more frequently should be updated or developed. This could be as simple as selecting a new starting random number daily, to using the random number generating capabilities of MATS or Excel for every sublot. ▪ The training, qualification, and requalification process for qualified testers, including adding a written test requirement for requalification, should be standardized. ▪ WSDOT does not have a program to qualify or recertify Region Independent Assurance Inspectors who ensure uniformity of material testing by WSDOT personnel.	▪ FHWA/WSDOT to do QA review of LPAs in 2013. ▪ WSDOT recommended to do rewrite of chapter 52 of Local Agency Guidelines manual where direction to LPAs for QA procedures is addressed.

State	Source	Written report or narrative email	Date of report (year)	Key observations related to LPA construction or materials QA	Recommended actions suggested
Washington	WSDOT	Conference Call with Local Program Office	1/8/2013	▪ Local agency guidance manual incorporates WSDOT's construction manual by reference. ▪ Reviewing specification and manual requirements to identity exemptions for simpler LPA projects. Some requirements are too intensive for LPAs. ▪ To become a CA, an LPA undergoes an interview process and then performs a pilot project to see how it performs. Once every 3 years, WSDOT reviews the LPA's documentation for a recent Federal-aid project. ▪ For non-CAs, WSDOT enters into an agreement that defines the roles and responsibilities of all parties. ▪ For non-CAs, WSDOT may require the LPA to retain a consultant project manager (or the LPA may enter into an agreement with a CA to manage the project for them). ▪ Level of WSDOT oversight varies with project complexity. ▪ WSDOT is willing to help arrange for interviews with LPAs as part of Phase II. Kent County and the City of Seattle were suggested as possible examples of CAs to interview further.	None
Wisconsin	FHWA	Local Program Construction Administration, Financial Accountability Assessment	2008	▪ All local program construction projects are handled by WisDOT rather than the LPA. WisDOT lets the project, provides construction oversight, and makes payments. Upon project completion, the LPA is billed its pro-rata share of the project costs incurred by WisDOT. ▪ Very few Completion Certificates, Letters of Acceptance, Materials Certificates, results of materials acceptance tests, or materials verification tests were found in the project files reviewed. ▪ Little documentation was found for site visits by the Master Consultant or Local Program Managers during construction or for final inspection of completed work.	Suggestions had to do with financial accountability.

APPENDIX F. VDOT LPA RISK FACTOR AND LEVEL OF OVERSIGHT ASSIGNMENT

VDOT's project risk and oversight assessment method requires the VDOT Project Coordinator to identify applicable project elements from figure 18, which affect the level of risk. By summing the weighted values for each selected element, a risk factor is determined. That risk factor correlates to an anticipated level of oversight found in figure 19.

Element	Value (factor)	Check Elements That Apply	Total Factor per Element
Federal Oversight	20		
National Highway System	20		
Funding			
Federal Funded (non-Enhancement)	15		
State Funded	10		
Federal Enhancement (Impacts R/W)	7		
Federal Enhancement (Off R/W)	1		
Completed Project Maintenance			
State Maintained Project	10		
Locality Maintained Project	2		
Project Category *			
Category I	2		
Category II	5		
Category III, IV, V	10		
Locality Experience Administering Project			
Low Level	15		
Intermediate Level	10		
High Level	5		
Factor Total			

* See Appendix B for project category description

Source: VDOT

Figure 18. Screenshot. Project risk assessment.

Level of Oversight	Range of Factor Total
High (H)	> 45
Moderate (M)	25-55
Low (L)	< 35

Source: VDOT

Figure 19. Screenshot. Anticipated level of oversight.

In general terms, figure 20 illustrates the characteristics of projects at the three levels of oversight.

Oversight Level	Impact/Probability
High (H)	Significant impact on infrastructure due to non-compliance - Significant effects to quality of construction, cost, & schedule; High probability of non-compliance
Moderate (M)	Moderate impact on infrastructure due to non-compliance - Moderate effects to quality of construction, cost, & schedule; Moderate probability of non-compliance
Low (L)	Minimal impact on infrastructure due to non-compliance - Minimal effects to quality of construction, cost, & schedule; Low probability of non-compliance

Source: VDOT

Figure 20. Screenshot. Project characteristics at three levels of oversight.

Actual activities associated with each oversight level vary with the unique characteristics of each project. These can include such considerations as unusually complex project features, sensitive environmental or socio-economic issues, and the LPA project manager's experience with similar transportation projects.

Figure 21 is an example of oversight activities for Federal-aid projects; many of these may not be applicable to State-aid projects. The VDOT Project Coordinator and the LPAs Project manager should develop more specific oversight activities and their frequency based on specific project needs and conditions.

Oversight Level	Oversight Activities
Low	• Kickoff (scoping) meeting attendance • Plan development coordination meeting • Final plan review • Pre-construction meeting attendance • Random site visits during construction • Final acceptance inspection
Moderate	• Kickoff (scoping) meeting attendance • Plan development coordination meeting • 30% plan review • Public hearing attendance • Final plan review • Pre-award bid review • Pre-construction meeting attendance • Monthly to quarterly site visits during construction • Final acceptance inspection
High	• Kickoff (scoping) meeting attendance • Monitor consultant acquisition process • Right-of Way coordination meeting • Environmental coordination meeting • Plan development coordination meeting • 30% plan review • Public hearing attendance • 60% plan review • 90% plan review • Bid document review • Final plan review • Pre-award bid review • Pre-construction meeting attendance • Weekly to monthly to quarterly site visits during construction • Final acceptance inspection

Source: VDOT

Figure 21. Screenshot. Examples of oversight activities associated with oversight levels.

The LPA and VDOT's Project Coordinator may increase or decrease the level of oversight for a particular project based on the LPA's performance on previous projects and results of VDOT compliance reviews. As VDOT's confidence in the LPA's ability to administer projects increases, the level of oversight may be reduced. However, oversight may be increased based on any number of factors, including the LPA assuming responsibility for more complex projects. LPA experience becomes an important factor in oversight and risk—the more experience the LPA gains, the more VDOT will typically reduce its level of oversight.

APPENDIX G. STATE TRANSPORTATION DEPARTMENT SURVEY RESULTS

Note, where multiple surveys were received from a single State transportation department, a composite answer was generated to reflect the collective response of that State transportation department. Also note that in the Comments sections, the parenthetical abbreviation that begins each comment is the State of the respondent. The comments are verbatim.

How does your agency assure the LPA is complying with QA standards and specifications?

(out of 32 responses)

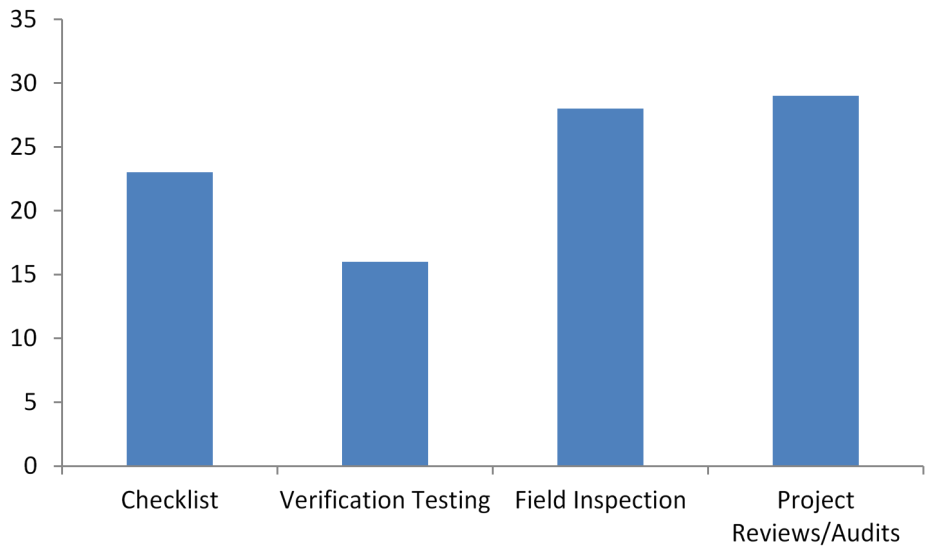


Figure 22. Bar Graph. Responses on how State transportation departments assure LPAs are complying with QA standards and specifications.

Comments:

(DE): We conduct the majority of the testing and oversight.

(IN): DOT requires that the LPA have a certified Employee in Responsible Charge, ERC, to be able to apply for or manage a project, also the LPA consultants must also have certifications to administer/manage the project.

(MN): We have staff specifically employed to help.

(NV): Review and approval of LPA's QA procedures prior to NTP of contract.

(OK): The LPA projects are advertised, let and awarded by the DOT. Some contracts are administered directly by DOT, others are administered by consultants or a county circuit engineering district. In those cases the consultant/CED reports to a DOT district. Uses SiteManager to administer contract.

(OR): These pieces are in place when doing DOT administered projects but not for LPA administered projects.

(SD): The Transportation Enhancement Program is the only program where LPA's administer the projects. All other federal aid projects are administered by the DOT. We recently changed our processes to not allow LPAs to administer any federal aid projects, due to certification issues.

(UT): On Federal-aid projects our LPAs use DOT's design and construction processes.

(VT): Our Materials & Research Group prepares listing of certification and testing requirements on LPA projects per the Agency's approved Quality Assurance Program. We withhold payment to LPAs until they have certified that they have been complied with on payment requests.

(WI): Uses a Management Consultant to oversee the Local Program. Construction consultants are selected to oversee individual projects. These consultants perform verification testing.

Has your agency trained its staff (or consultants) on how to oversee the construction QA on LPA projects?

(out of 31 responses)

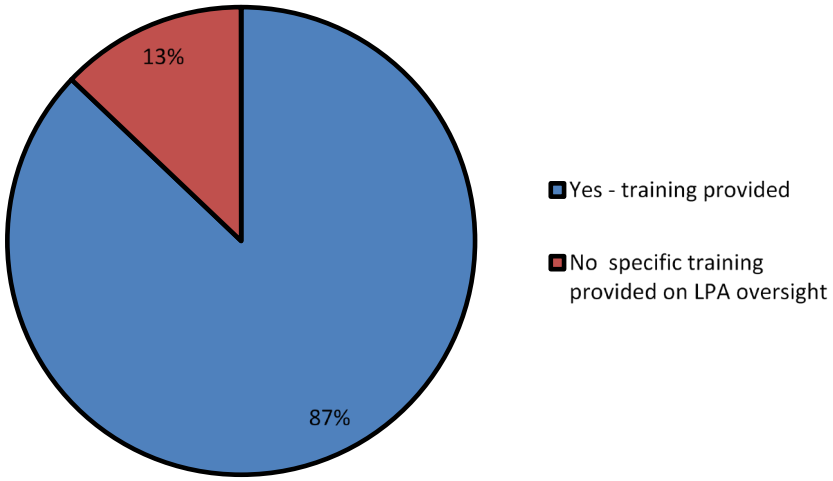


Figure 23. Pie Chart. Responses on whether State transportation departments have trained staff on how to oversee construction QA on LPA projects.

Comments:

(CT): Training on Municipal Manual Chapter 18, Testing Requirements.

(DE): No—state administers contract.

(KS): Yes—informal on-the-job training.

(MI): No formal training, most has been through meetings, conferences, and presentations.

(NV): No- Formal training has been more focused on LPA's. We work with FHWA to provide training on administration of all federal-aid projects with our own staff.

(NY): Yes- some training has been provided since local projects operate differently than traditional Department projects.

(TX): No specific training on this topic.

Has your agency trained LPAs on how to implement the QA standards for a Federal-aid project?

(out of 31 responses)

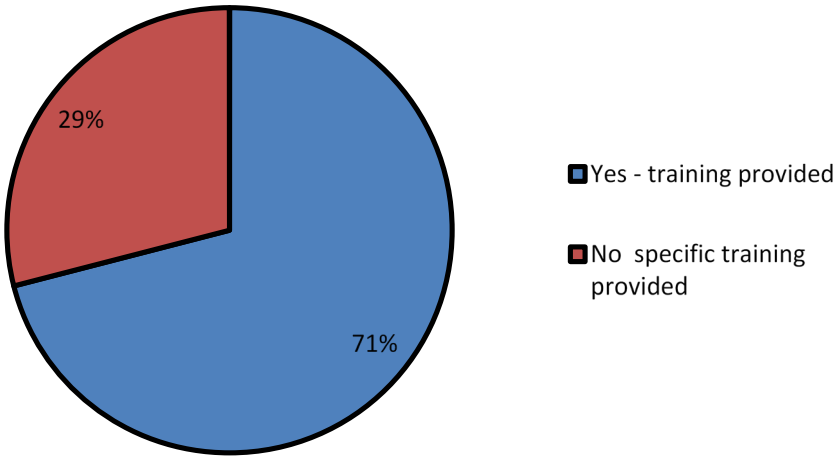


Figure 24. Pie Chart. Responses on whether State transportation departments have trained LPAs on how to implement QA standards for a Federal-aid project.

Comments:

(CT): Training on Municipal Manual Chapter 18, Testing Requirements.

(KS): We have 2-3 training sessions each year on specific areas.

(ME): Training is mainly in the pavement and concrete areas.

(NV): Most of the training is brief and high-level.

(NC): No formal training. Overview sessions and webinar training are conducted. Individual project training has also been conducted.

(OR): No specific training provided. LPAs try to follow the guidance of the state QA program, but it isn't always a good fit for them.

Does your agency account for compliance with these QA standards and factor it in when estimating the overall cost of the LPA project?

(out of 29 responses)

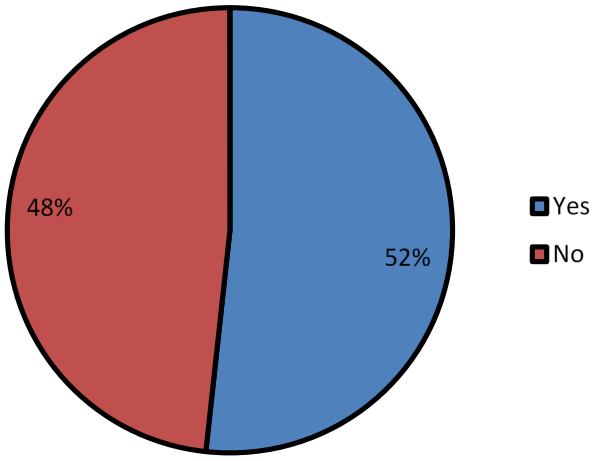


Figure 25. Pie Chart. Responses on whether State transportation departments account for the QA standards and factor them in when estimating overall cost of the LPA project.

Are the LPAs responsible for the additional funds to complete the necessary testing to comply with the QA standards?

(out of 30 responses)

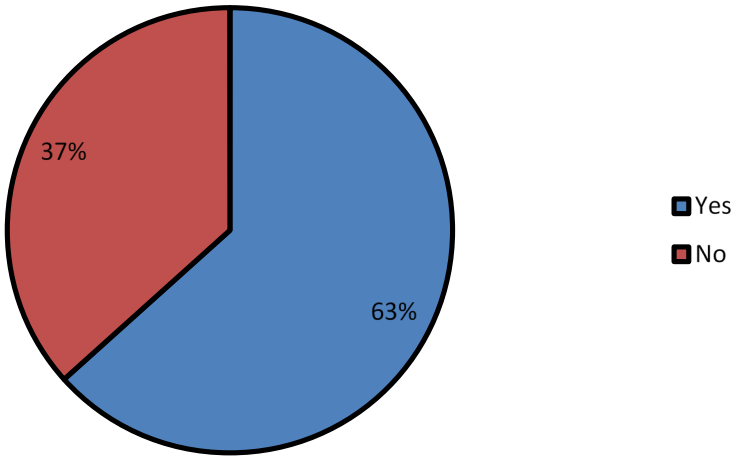


Figure 26. Pie Chart. Responses on whether LPAs are responsible for the additional funds to complete the necessary testing to comply with the QA standards.

Comments:

(CT): Included in the LPA agreement work scope.

(MI): The majority of the time the LPA will 100% fund the Construction Engineering (CE), Inspection & Testing (I&T) for the project. However there is a small amount of LPA projects in Michigan that utilize Federal Funds for the CE and I&T.

(NC): Yes. However, these can be reimbursed to the LPA if funding is available.

(OR): Funds would be programmed in as a project cost.

Which of the following procedures or activities does your agency maintain or conduct?

(out of 29 responses)

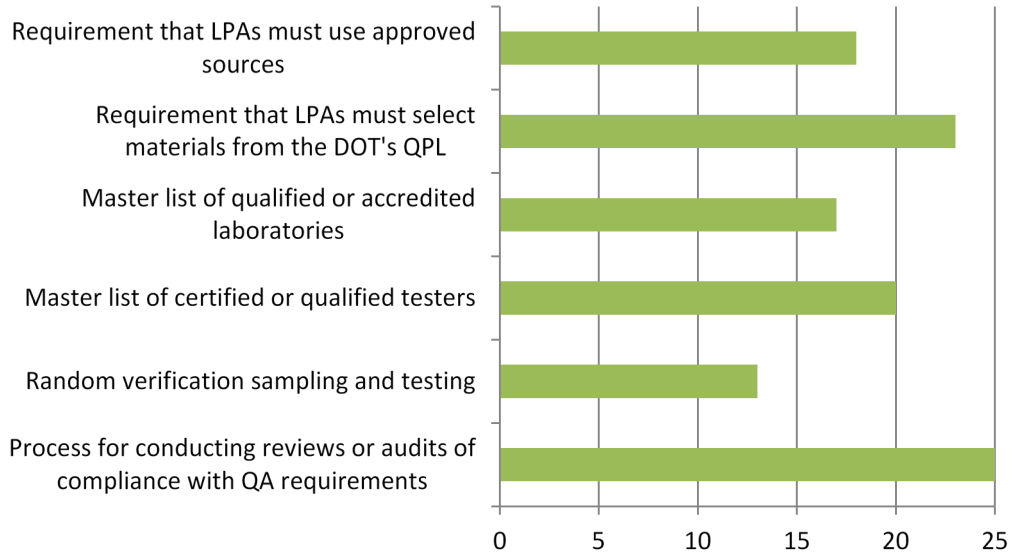


Figure 27. Bar Graph. Responses on which procedures or activities State transportation departments maintain or conduct.

Comments:

(CT): DOT provides schedule of minimum requirements for sampling materials for test.

(KS) For local roads (non-NHS) LPAs follow their specifications - for NHS they follow DOT specs.

(OR): Certified LPAs develop their own procedures that are reviewed and approved by the DOT. The procedures the DOT would undertake would vary depending on the LPA approved program specifics.

(UT): All materials must meet our current DOT specs for FAA projects.

(VT): While not making master lists of qualified testers or laboratories online, we do provide this information if LPA or its consultant has difficulty with this. Most of the consultants used by LPAs are very much in the loop on this.

(WS): We have a QPL but the agency/contractors are not required to utilize it for all products.

Does your agency allow LPAs to use their own specifications or standards for activities or items related to materials or construction QA?

(out of 32 responses)

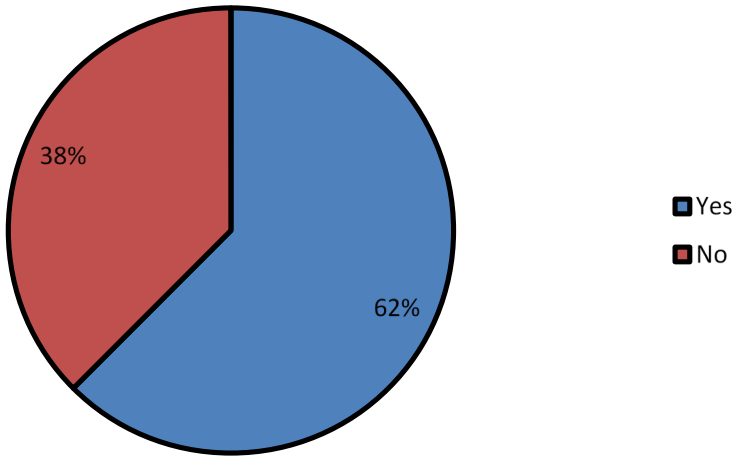


Figure 28. Pie Chart. Responses on whether State transportation departments allow LPAs to use their own specifications or standards for activities or items related to materials or construction QA.

Comments:

(IN): LPA-generated specs are given to the DOT for review and incorporated into the contract before letting if acceptable.

(IA): LPAs can write special provisions for items not covered by DOT Standard Specs

(KS): For local roads (non-NHS) LPAs follow their specifications - for NHS they follow DOT specs.

(MD): LPAs must get approval from State for any specs or standards not previously approved by state.

(MI): LPA specifications need to be approved by DOT.

(NE): LPA specifications are reviewed and approved by DOT.

(OR): In general, LPA uses DOT standards with some modifications through the project special provisions.

(UT): Yes—if the LPA standard is equal or better than UDOT's Specifications.

(WI): LPA projects generally incorporate the state standard specifications into their projects with special provisions used to make specific changes.

Does your agency's IA program cover the LPA's testers and equipment?

(out of 31 responses)

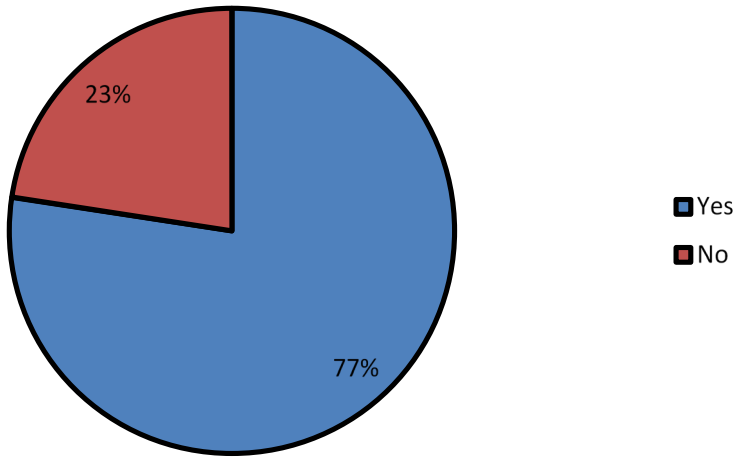


Figure 29. Pie Chart. Responses on whether the IA program of State transportation departments covers the LPA's testers and equipment.

Comments:

(MI): NHS routes only receive IA and must be certified for the testing they are performing.

(NV): No- They must obtain their own for the project that meets the requirements.

(NY): Yes- compliance is difficult since DOT is not informed of timing of specific work to perform ISAT.

(OR): Yes- If the certified LPA chooses to include this as part of the approved QA program.

Do the LPAs develop their own IA programs for use on Federal-aid projects?

(out of 33 responses)

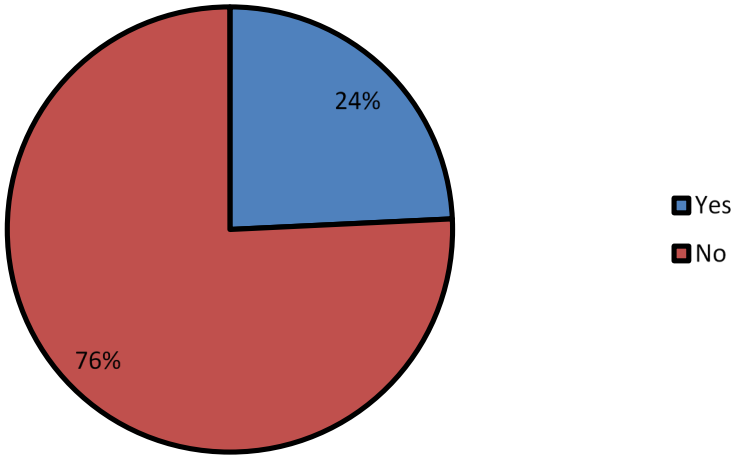


Figure 30. Pie Chart. Responses on whether the LPAs develop their own IA programs for use on Federal-aid projects.

Comments:

(NV): No—Not really. They are struggling with the requirement for IA, especially the smaller LPAs.

(OR): Yes—They can either develop their own, or use the standard DOT program.

(TX): Yes—Applies to only major projects.

On a typical federally funded LPA project, please characterize the nature of your level of effort for materials and construction inspection.

(out of 27 responses)

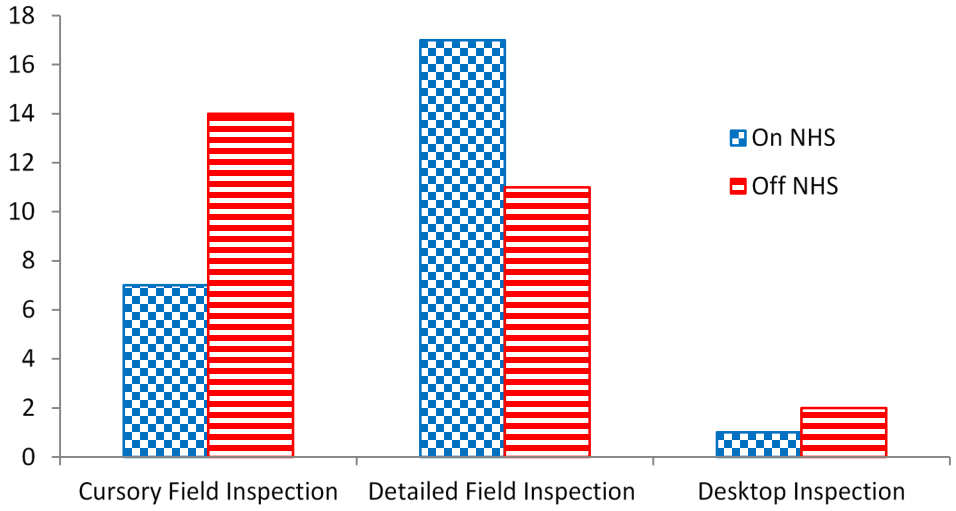


Figure 31. Bar Graph. Responses on the nature of the State transportation department level of effort for materials and construction inspection on projects on and off the NHS.

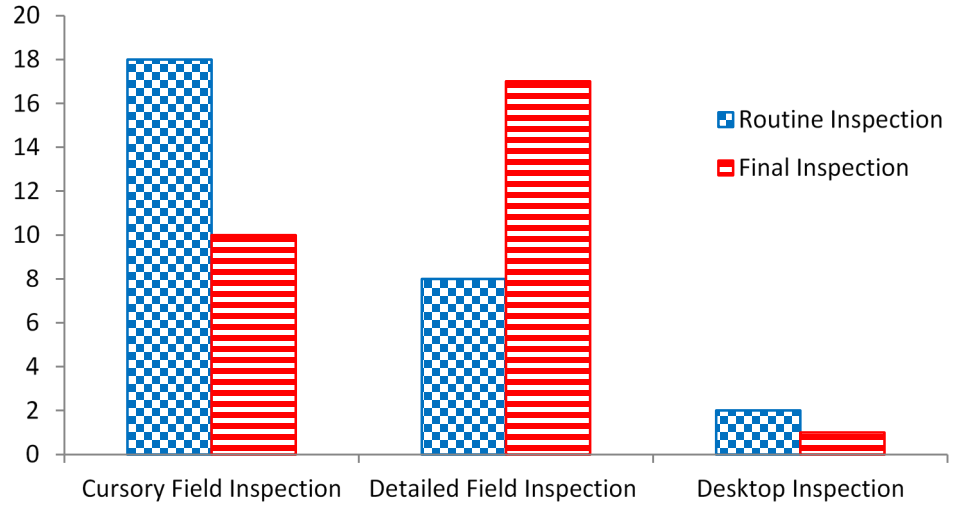


Figure 32. Bar Graph. Responses on the nature of the State transportation department level of effort for materials and construction inspection (routine or final) on projects.

Comments:

(MI): Routine periodic inspection may also include a file review. All projects require a final inspection and file review before issuing final payment. Roadway classification does not matter, the use of Federal Aid is the criteria we use.

(MN): Very few projects on the NHS are handled by LPAs

(OR): Level of effort would depend on the specific LPA approved QA program.

What level of construction inspection (prior to final acceptance) do you apply for each of the following project types?

(out of 31 responses)

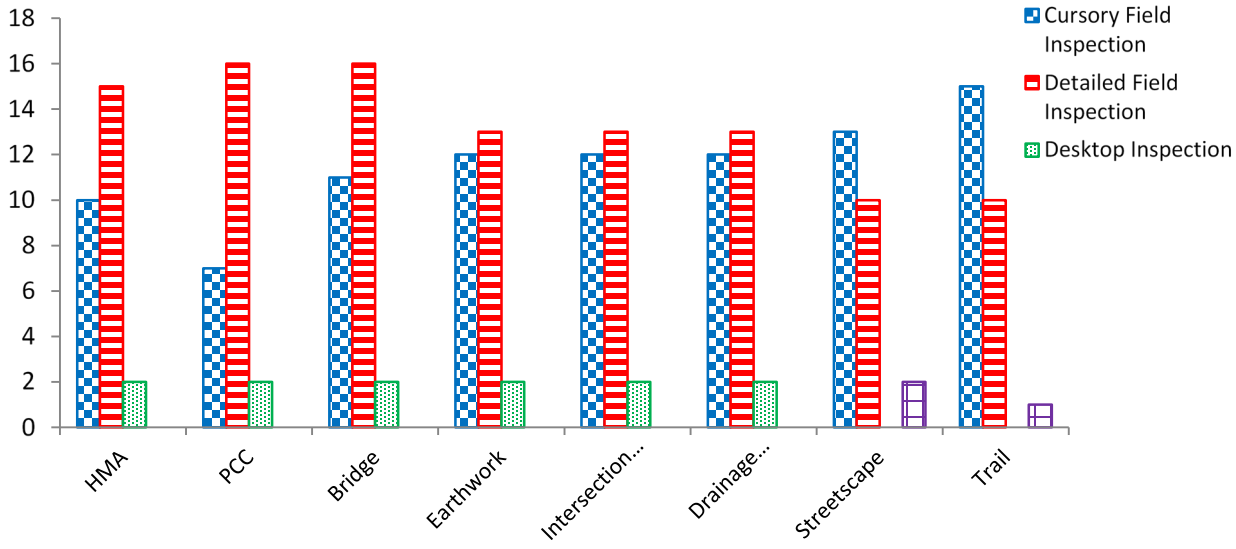


Figure 33. Bar Graph. Responses on the level of construction inspection (prior to final acceptance) that State transportation departments apply by project type.

Comments:

(MD): State inspects at critical points in project construction.

(MI): DOT performs a cursory field inspection and a review of project documentation prior to final acceptance. Detailed field inspection is the LPA's responsibility.

(OR): Depends on the specific LPA approved program, but state would generally perform little to no onsite overview.

(UT): DOT requires that the CE work is done by Consultants who have passed materials and construction certification testing.

(WI): Department let projects are managed by consultants contracted with the department.

Estimate how frequently the following issues may have occurred on federally funded LPA projects.

(out of 28 responses)

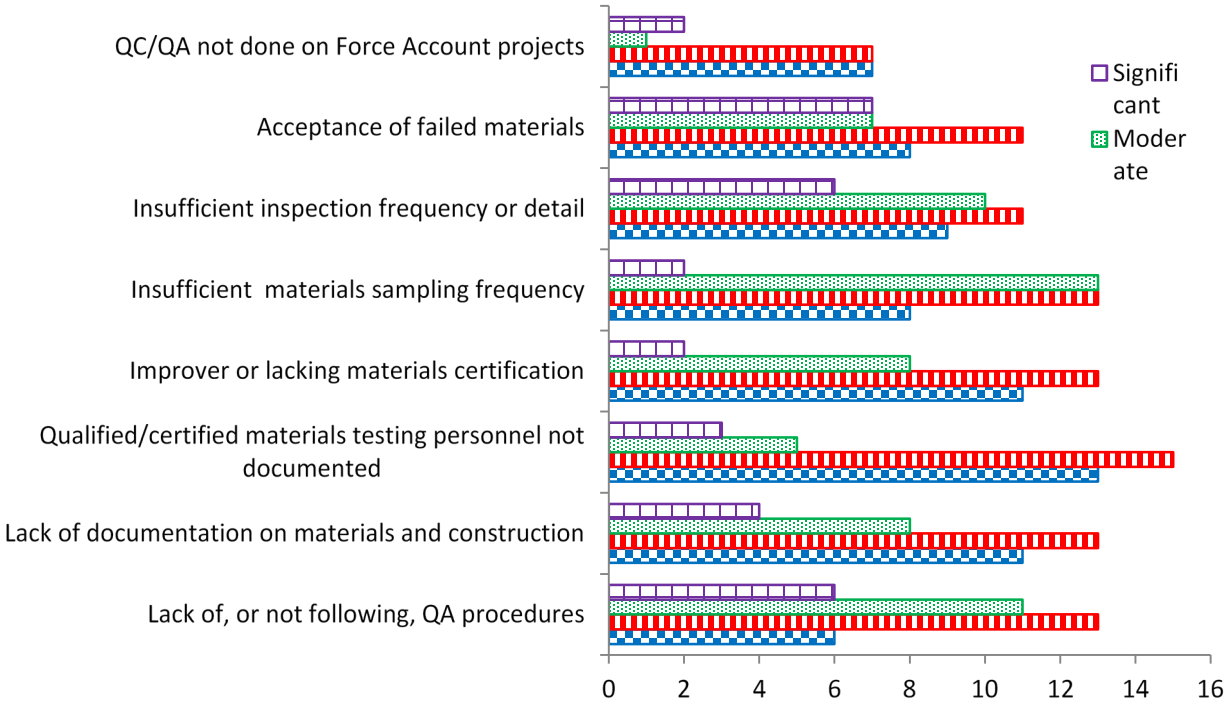


Figure 34. Bar Graph. Estimates of how frequently certain issues may have occurred on federally funded LPA projects.

Estimate the perceived impact of QA issues.

(Out of 36 individual responses—results include all responses received from individuals, i.e., results from multiple representatives of a State transportation department were not aggregated into a single adjusted response)

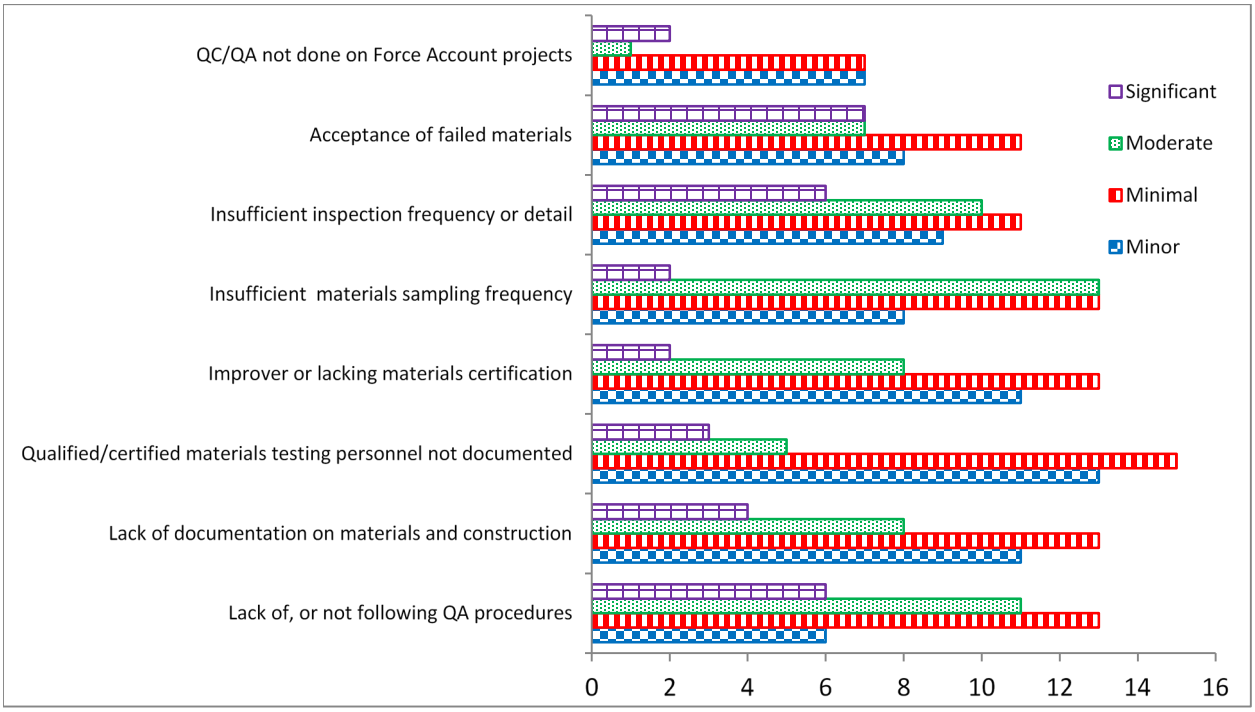


Figure 35. Bar Graph. Estimates of the perceived impact of QA issues.

Comments:

(NV): As our resident engineers conduct thorough field inspections before releasing an LPA Project, the impact is time and money. They don't release a project until errors are corrected.

Best Practices to Mitigate Challenges with QA on LPA projects.

(AZ): All LPA projects with the exception of LPA's that have been approved as Certification Acceptance are administered by DOT. LPA projects administered by DOT have virtually no instances of non-compliance.

(CT): District MSAT members provide continuous education to LPAs.

(GA): Certification and training.

(IN): Treating LPA projects with the same level of effort as any DOT project.

(IA): Very knowledgeable and experienced DOT district construction and materials staff who know the LPAs they work with - which ones need more or less help.

(ME): Training of LPAs on QA requirements; attendance by DOT at precon/prepaving meetings; communication between IA staff and LPA consultants; DOT performing HMA lab testing for LPAs; HQ staff assigned for LPA oversight.

(MD): Meet with locals on a regular basis to make sure they understand the program processes and to address changes from FHWA on program oversight. We are in process of developing a guide for locals.

(MI): New QC/QA specifications for concrete for LPA projects that is similar to DOT's trunkline specifications concrete QC/QA.

(MN): We hired a staff specifically to help train and advise in the field, required certified personnel, only pass funds through state aid eligible cities and counties which ensures they have appropriate staff.

(NE): Checklists.

(NV): We require the LPA to follow our QA procedures or have their procedures approved by our construction office. Additionally, our resident engineers oversee the LPA projects much like they do a regular DOT project, with the LPA completing the work and the DOT resident engineer signing off on the work. The LPAs are vetted by our Central office for each project. They each are given the expectations/requirements for the projects.

(NC): Face to face meetings between DOT and LPA staff to discuss best practices.

(OH): Reports on LPA construction monitor field activities on a monthly basis.

(OR): For non-certified LPA, we perform a complete review of all QA and payment documentation. This allows any missed steps to be identified and rectified prior to final contract payment.

(UT): We have the same group in Materials & Research prepare the testing and certification requirements per our approved QAP just as they would on an Agency-bid project.

(WS): After issues have been identified via the yearly program management reviews we develop training and best practices that are sent out to all LPA agencies.

(WI): Construction consultants are used by the department to oversee LPA construction projects. These consultants perform verification testing.

Does your agency prepare the materials sampling and testing schedule for a LPA-administered Federal-aid project?

(out of 26 responses)

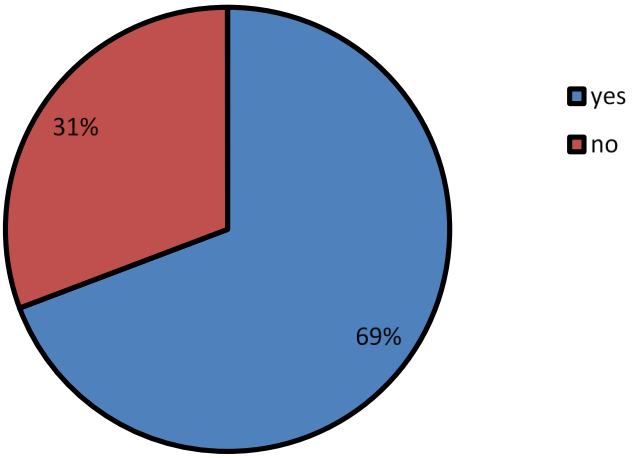


Figure 36. Pie Chart. Response to whether State transportation departments prepare the materials sampling and testing schedule for a LPA-administered Federal-aid project.

Comments:

(AZ): No—DOT reviews the LPA's sampling and testing schedule for LPA administered projects.

(IA): Yes—Specified in DOT Specifications and Materials Instructional Manuals.

(ME): We provide a set of minimum testing requirements, which indicates testing frequencies.

(MI): Yes—These are established for all Federal Aid project through the DOT Materials Source Guide and Minimum Documentation Guide in addition to the plans, proposal, and specifications.

(MS): No—The LPA is responsible for generating a Sampling and Testing Proposal which is submitted to the agency for approval.

(NV): No—each LPA is required to submit their own schedule, which is required to meet FHWA/NDOT minimum frequencies.

(NY): Yes—standard DOT practices and frequencies are supposed to be adhered to.

(OR): Yes—For non-certified agencies. Certified LPAs can develop their own schedule and have it approved by DOT. If the project is DOT administered they follow DOT sampling and testing schedules.

(UT): It is a standard spec and is in our Minimum Sampling and Testing guidelines.

(WS): Yes—Some agencies with more lab personnel develop their own.

APPENDIX H. LPA GUIDANCE MANUALS

This appendix contains table 13, which summarizes information from LPA guidance manuals, if it exists, by State.

Table 13. LPA guidance manuals.

State	Date	LPA Manual or Other Guidance Related to QA	Other Information
Alabama	N/A	None	N/A
Alaska	N/A	None	N/A
Arizona	N/A	None	Construction administration procedures (including materials testing and construction inspection) are reviewed as part of the LPA certification process.
Arkansas	N/A	None	N/A
California	10/5/2012	Different requirements for projects that are on versus off the NHS. For projects that are off the NHS, LPAs may adopt their own QA program, which shall include as a minimum: Acceptance Testing, IA, and Testing of Manufactured Materials. If the LPA uses Caltrans test methods, Caltrans will perform the IA if requested. For projects on the NHS, LPA must follow the Caltrans QAP.	Comprehensive guidance In addition to its *Local Assistance Procedures Manual*, Caltrans also maintains a *QA Program Manual for Use by Local Agencies* (December 2008). LPA may use the Caltrans laboratory if Caltrans "local assistance work for others" resources are available.
Colorado	N/A	For projects that are constructed partially or entirely within CDOT ROW, within any roadway template, that add lanes, or have other work activities as determined by the CDOT Resident Engineer, the LPA must use inspectors that have successfully completed CDOT's Construction Inspector Qualification Program. For projects on the NHS, LPA must follow the Caltrans QAP. The CDOT *Construction Manual* gives guidelines on how each item should be inspected and documented. With regard to materials, LPAs are referred to the current CDOT *Field Materials Manual*. The LPA approved laboratory will perform the laboratory verification tests (refer to the Central Lab column in the CDOT *Field Materials Manual* QA schedule) at the frequency in the *Field Materials Manual* and/or in the specifications. Manufactured products are typically accepted based on Pre-Inspection, Certified Test Reports, Certificates of Compliance, Pre-Approval (listed on CDOT's approved products list Web site), or a combination thereof.	Approval of mix designs—CDOT versus LPA
Connecticut	7/2008	The Municipality through the State of Connecticut Division of Materials Testing shall test all materials being incorporated in the work.	None
Delaware	N/A	None	N/A

State	Date	LPA Manual or Other Guidance Related to QA	Other Information
Florida	N/A	The District LAP Administrators regularly review LPAs, which includes reviewing the sampling and testing record.	Training LPA webpage links to Caltrans and WSDOT's LPA webpages State has Oversight Plan
Georgia	2009	The GDOT Project Manager will assist the local government with understanding its material source approval responsibilities, rejection of materials procedures, batch material delivery ticket acceptance and retention procedures, materials sample and tests assurance procedures, and IA testing procedures. LPA is to use the QPL. QA must be done in accordance with 23 CFR 637 and GDOT's *Sampling, Testing, and Inspection Manual*. Consultants must be prequalified. GDOT does IA.	None
Hawaii	N/A	None	N/A
Idaho	7/2004	Limited guidance.	When estimating the total cost of a project, 10 percent should be added to address construction engineering. IDT will make a final inspection before the project is accepted on behalf of IDT and the LPA.
Illinois	1/2012	All materials that are used for construction will be inspected and tested for compliance with the requirements of the IDOT Standard Specifications, the Project Procedures Guide, and the Project Special Provisions. Supervision and inspection will be performed in accordance with the IDOT Construction Manual.	None
Indiana	4/18/2012	All professional services leading to federally funded construction must be performed by INDOT prequalified consultants or by LPA in-house staff who have been approved by INDOT as having the same technical qualifications specified for consultants. All PEs and construction inspectors must be trained and certified through the INDOT certified construction technician training and INDOT QA training programs.	None
Iowa	N/A	Construction inspection procedures under development.	N/A
Kansas	N/A	References the KDOT Construction Manual. KDOT area office heavily involved.	Separate guidance provided for bridge inspection.
Kentucky	1/31/2012	Limited.	Training provided on the LPA Guide.
Louisiana	N/A	None	N/A
Maine	N/A	For projects on the NHS, LPA may adopt the State's QA program or develop one of its own that is consistent with the CFR and is approved by the State transportation department and FHWA. For projects off the NHS, the LPA should have a program that is acceptable to the State transportation department, and that includes the six core elements.	FHWA LPA Training Materials are posted on the Web site. Manual on Construction Documentation.
Maryland	N/A	None	Primary focus is on bridge program.
Massachusetts	N/A	None	Focus is on ROW.
Michigan	N/A	None	N/A

State	Date	LPA Manual or Other Guidance Related to QA	Other Information
Minnesota	N/A	Guidance provided on recordkeeping (e.g., Daily Diary), quantities. QA program addresses acceptance, materials certification, and IA. All testers must be certified (Mn/DOT offers certification program).	State aid for local transportation was set up to help administer project.
Missouri	N/A	IA performed by MoDOT. Small quantities of materials may be accepted for an LPA project based on some combination of certification documentation, delivery tickets, and visual inspection. The MoDOT district representative shall periodically review the local project to verify that project administration procedures are adequate. A LPA Site Visit Checklist has been formulated to be used as a guide when visiting a LPA site. The checklist covers a wide range of details related to project administration and should be used as a guide by the LPA. The frequency of the site visits will be at the discretion of the MoDOT district representative and the adequacy of the LPA's administration. At least one visit and review at the beginning of the project and near the end of the project shall be conducted.	Site visit checklist.
Montana	5/07	Source of each type of material must be approved by the LPA. LPA may submit its construction oversight plan to the State transportation department for review and comment. Will generally following the State Construction Manual, with some approved exceptions (e.g., may perform its own IA sampling; certain items such as fencing, electrical items, geotextile, etc., may be accepted with an approved catalogue cut). Project Closure process includes verifying that the LPA prepared a materials certification form.	None
Nebraska	N/A	Comprehensive and detailed guidance. References the CFR, the NDOR Construction Manual, and Materials Sampling Guide. NDOR representative to provide guidance, review LPA's documentation, and visit site regularly. For projects on the NHS, the Nebraska QA program is incorporated. For projects off the NHS, the LPA may develop its own QA program or can defer to the Materials Sampling Guide. NDOR representative conducts final walk through along with the LPA.	None
Nevada	4/2010	Limited guidance. Directed to use NDOT's Construction Manual. LPA to develop an IA program in accordance with NDOT Construction Manual. NDOT Materials Division will approve asphalt and cement mix designs for use on projects within NDOT's ROW. NDOT resident engineer performs oversight based on major versus minor project; whether or not project will be maintained by NDOT. NDOT resident engineer performs a final inspection along with the LPA project manager.	None

State	Date	LPA Manual or Other Guidance Related to QA	Other Information
New Hampshire	3/12	LPA to develop and submit to NHDOT a QA program for each project based on the NHDOT Quality Assurance Program for Municipally Managed Federal-Aid Projects. NHDOT performs IA.	None
New Jersey	N/A	None	Project selection; overview of Federal-aid program.
New York	N/A	None	Manual for Uniform Record Keeping.
North Carolina	4/2009	NCDOT inspects and approves all projects.	None
North Dakota	5/2008	Reference the North Dakota Construction Records Manual, Field Sampling and Testing Manual, and Field Office Procedures Manual. Guidance provided on calculating quantities. NDDOT has an audit team that regularly inspects construction contracts for documentation, materials and sampling procedures.	
Ohio	N/A	Limited; assumes a consultant will be used.	Guidance on procuring consultants.
Oklahoma	N/A	None	N/A
Oregon	N/A	LPAs are to use the State transportation department construction manual.	None
Pennsylvania	N/A	None	N/A
Rhode Island	N/A	None	N/A
South Carolina	N/A	The LPA (with assistance from the SCDOT resident construction engineer) should prepare a minimum sampling requirements checklist in accordance with SCDOT Office of Materials and Research and SCDOT's Construction Manual. Inspection and acceptance testing by the LPA should be performed at the frequency, and with the methods, specified in the Construction Manual or as recommended by the manufacturer. All testing should be performed by an AASHTO accredited laboratory and the disposition of non-conforming materials should be documented by the LPA and approved by the resident engineer or designee. IA testing will be performed by SCDOT.	Checklists and forms.
South Dakota	N/A	None	N/A
Tennessee	2/1/2011	The TDOT regional construction manager and materials and tests manager will each assign a TDOT representative to participate in the project preconstruction conference. CEI firm to be certified according to TDOT SOPs; sampling and testing in accordance with SOPs. TDOT conducts verification sampling and testing. TDOT conducts IA.	TDOT checklists and forms
Utah	3/10	Consultants performing construction engineering must be certified. Follow UDOT construction and materials manuals.	None

State	Date	LPA Manual or Other Guidance Related to QA	Other Information
Vermont	4/09	LPAs are given two options: When soliciting proposals for construction engineering, the municipality includes in the scope of work that the engineer will be responsible for arranging for independent testing services in accordance with the approved material sampling and testing plan. The engineer will then oversee the sampling and testing and will provide certification to the municipal project manager for final acceptance. The municipality includes the approved material sampling and testing plan in the contract bid documents and relies on the chosen contractor to arrange for independent testing services and oversees all such testing. All results would be detailed and certified to the municipal project manager for final acceptance.	None
Virginia	N/A	The LPA is referred to the VDOT Construction and Inspectors Manuals for guidance regarding project inspection and monitoring. The VDOT construction project monitor will provide oversight inspections of Federal-aid and VDOT-maintained projects. The Construction Manual provides detailed guidance for the specifications contained in the VDOT Road and Bridge Specifications. The Inspectors Manual contains a series of tables that identify the primary inspection duties for major categories of work.	VDOT conducts annual assessments of LAPs.
Washington	6/12	Comprehensive guidance manual. QPL or Request for Approval of Material. Qualified tester program (for projects on the NHS using Federal funds)—agency can contract with WSDOT to fulfill requirement, can pursue qualification through WSDOT program, or use an accredited laboratory. LPA can use the WSDOT forms or can create its own, as long as the same information is provided.	Construction inspection, acceptance sampling and testing, etc. are part of Certification Acceptance process. WSDOT conducts regular QA reviews of local agency bridge programs (minimum of once every 3 years). Training provided for LPAs.
West Virginia	N/A	None	N/A
Wisconsin	N/A	None	N/A
Wyoming	N/A	None	Guidance on consultant selection.

N/A = Not Applicable

APPENDIX I. PRELIMINARY REVIEW OF S&O AGREEMENTS

This appendix contains table 14, which summarizes a preliminary review of S&O agreements by State. The page numbers reference where this information can be found in the source documents.

Table 14. Preliminary review of S&O agreements.

State	Rating of Agreement	Key Points Regarding LPA Program	Key Points Regarding Materials QA	Key Points Regarding Construction Oversight
Arkansas	Good	More specific to LPAs and spells out specific actions that cannot be delegated to LPAs.	Process reviews include both State transportation department and LPAs (p. 67). Clearly states State transportation department must monitor QA program for construction on Federal-aid projects not on NHS (p. 80).	Repeats in several places that LPA projects must follow State transportation department construction procedures. Clearly states State transportation department must inspect construction of all Federal-aid projects (p. 30).
Arizona	Vague	Very little specific to LPAs in general. FHWA approves any LPA CA agreements (p. 13).	Performance measures (p. 24) included but not clear whether they include LPA projects.	Low-risk projects are defined in a way that implies that almost all LPA projects would be considered low-risk (p. 19, note 1) and FHWA grants approval (in advance of project delivery) for inspections (note 2) on low-risk projects.
California	Limited	LAP and Caltrans were set up to provide oversight to LPAs. Clearly written out responsibilities in several places.	Public Agency Furnished Material guidelines (table, p. 35).	Attachment 5—Strategic Project Oversight Selection Process (Local Assistance Projects)—specific to local agencies (p. 62). Purpose of the construction program clearly stated, yet not specific to LPAs. (p. 22).
Colorado	Good	LPAs monitoring abilities written out clearly. Adequately states CDOT's responsibilities in the oversight of local agency projects in several places. LPA requirements and assignments clearly expressed in tabular format (pp. 96–98).	Local agency QAR recommends a material management plan be developed (p. 92). Delegation of approval and review of material for LPAs (table, pp. 38–39). Table 13—FHWA Required Action list (Pavements and Materials) (p. 46)—Not specific to LPAs.	Response to the risk of CDOT and local agencies not being able to control qualifications in construction (Risk 2, p. 92). CDOT project-level oversight for construction mentioned (p. 8). Table 31—Local Agency Administered Projects and activity needed (p. 80).
Florida	Good	Use of summary tables to indicate delegation of authority (table 6). LPA incorporated throughout document. Responsible charge explicitly defined.	QA actions by FHWA spelled out regarding LPA (p. 11). No mention of LPAs in materials certification section (p. 57).	Inspection requirements for LPAs are spelled out, along with accountability. FDOT clearly cited for responsibility of construction inspections. LPA projects constructed in accordance with State laws (non-NHS) and LAP manual (local facilities).

State	Rating of Agreement	Key Points Regarding LPA Program	Key Points Regarding Materials QA	Key Points Regarding Construction Oversight
Georgia	Limited	GDOT's responsibilities to local agencies stated in several places (p. 9). Programs that LPAs cannot delegate are clearly stated (p. 8). LPAs must follow Uniform Act (p. 12). FHWA is ultimately responsible for local public agency projects.	Not clear whether LPA is included; states GDOT's and FHWA's responsibilities for material certification (p. 32). Materials Assurance Plan (MAP) and subsets created to assure quality of materials; no implication of LPAs.	Construction standards and responsibilities in tabular format—unclear with LPA involvement (p. 31).
Iowa	Good	Clearly states the regulations of Iowa DOT's Oversight of LPA Federal-aid projects (pp. 109–120). LPA developed projects are monitored by the Office of Right of Way (p. 20). Iowa DOT must report the LPA Stewardship to the FHWA (p. 74).	MAP was developed to assure the quality of materials, yet no specification to LPAs (p. 39). Public Agency Furnished Material requirements discussed in tabular format (p. 95). District Materials staff may oversee LPA projects to assure quality material technicians (p. 120).	Makes clear that construction inspections should be performed jointly by FHWA and the administrating agency's representative (p. 17). Federal laws, regulations, and policies dealing with construction spelled out, yet little specification to LPAs. Clearly spelled out construction requirements and authorities (p. 85). LPA construction inspection staff requirements stated in appendix I.
Illinois	Limited	Very little specific to LPAs in construction phase. Delegates authority of construction to eligible public agencies and ILDOT responsible for appropriate use of funds.	Mentions Manual for Materials Inspection-Project Procedures Guide for all Federal-aid projects.	Makes clear that ILDOT is responsible, including for project/activities by LPAs. Mentions construction is core problem area needing attention.
New Hampshire	Vague	Clearly states definition of LPA and abilities of the agency (pp. 12–13). NHDOT is responsible for federally funded LPA projects (p. 12).	Delegation of authority in material certification (p. 36).	Summarized in table format with delegation of authority included (p. 38).
Ohio	Good	Clearly states which project activities ODOT can/cannot delegate to LPAs (p. 61). Shows the process of reviews and regulation checks from the FHWA to ODOT to LPAs.	Not clear whether LPA is specifically targeted in goals and requirements. Monitoring of Quality Assurance (Table, p. 69, and pp. 74-75).	FHWA Ohio Division Office responsibilities in construction mentioned, yet no specific reference to LPAs. Spells out that FHWA will provide technical assistance and recommendations to assure quality of construction on local level. Construction inspections will occur on FHWA Oversight Projects (p. 67) (table, p. 34).

State	Rating of Agreement	Key Points Regarding LPA Program	Key Points Regarding Materials QA	Key Points Regarding Construction Oversight
Pennsylvania	Limited	More specific to LPAs and clearly spells out the oversight designation criteria (p. 13 and table 1, p. 10).	Little specification with LPAs. PennDOT has the responsibility to see that LPAs must meet requirements for materials under 23 CFR Part 635—Final Rule General Material Requirements (p. 20)	States in several places that PennDOT has the responsibility for the design and construction of all Federal-aid projects, including projects under LPAs (pp. 4 and 20).
Virginia	Vague	Nothing specific to LPAs in construction phase.	No reference to LPAs in this section.	No reference to LPAs specifically. Limited to one statement that VDOT will assume responsibility of oversight for all phases, including construction inspection.
Washington	Limited	LPA performance indicators repeated in several places (e.g., p. 28). Use of summary tables to indicate performance measures (appendix C, pp. 73–79).	Little to no specifications for material QA for LPAs.	Performance indicators for local-agency owned bridges clearly spelled out (p. 14). Construction inspection and required actions by FHWA and WSDOT (table, p. 25)—not specific to LPAs. Limited specification of LPA—Business Activities for construction reviews by FHWA and WSDOT indicated (table, pp. 15–16).

MAP =Materials Assurance Plan
ILDOT = Illinois Department of Transportation

APPENDIX J: LPA SURVEY RESULTS

This appendix presents the LPA survey results, including the question, the number of responses, and a pie chart of bar graph illustrating the results.

What is the estimated size of your construction program?

(out of 33 responses)

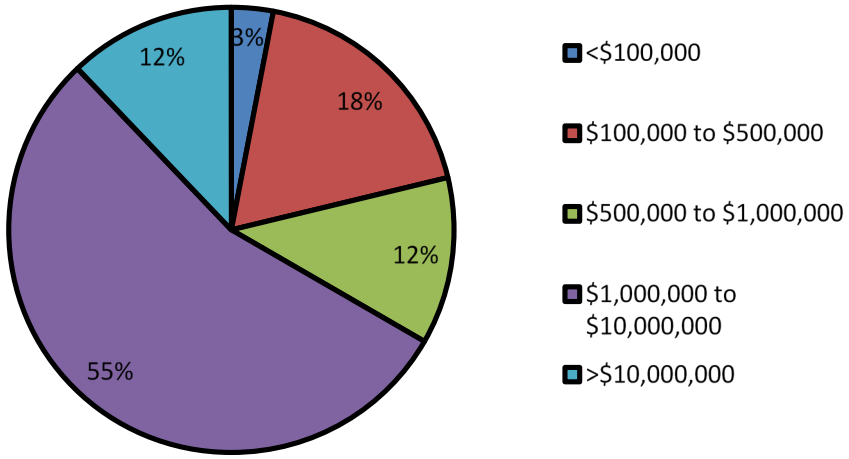


Figure 37. Pie Chart. Responses on estimated size of LPA construction programs.

Estimate what percentage of your construction program is performed using Federal-aid funds.

(out of 33 responses)

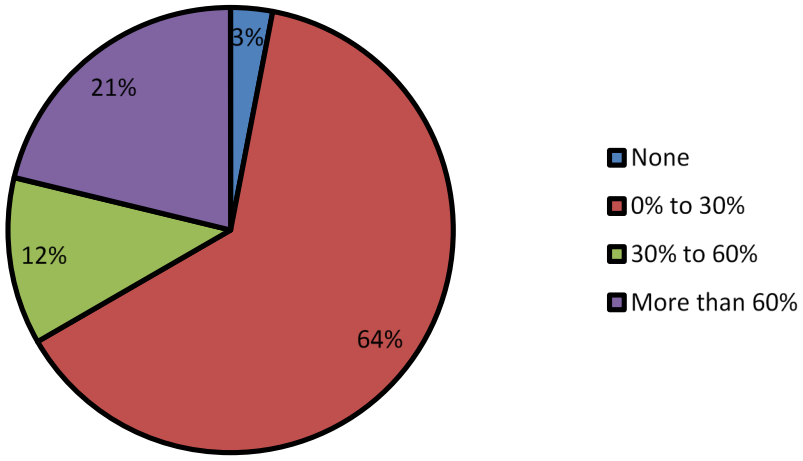


Figure 38. Pie Chart. Responses on percentage of LPA construction program performed using Federal-aid funds.

What project elements are typically included in your agency's Federal-aid projects?

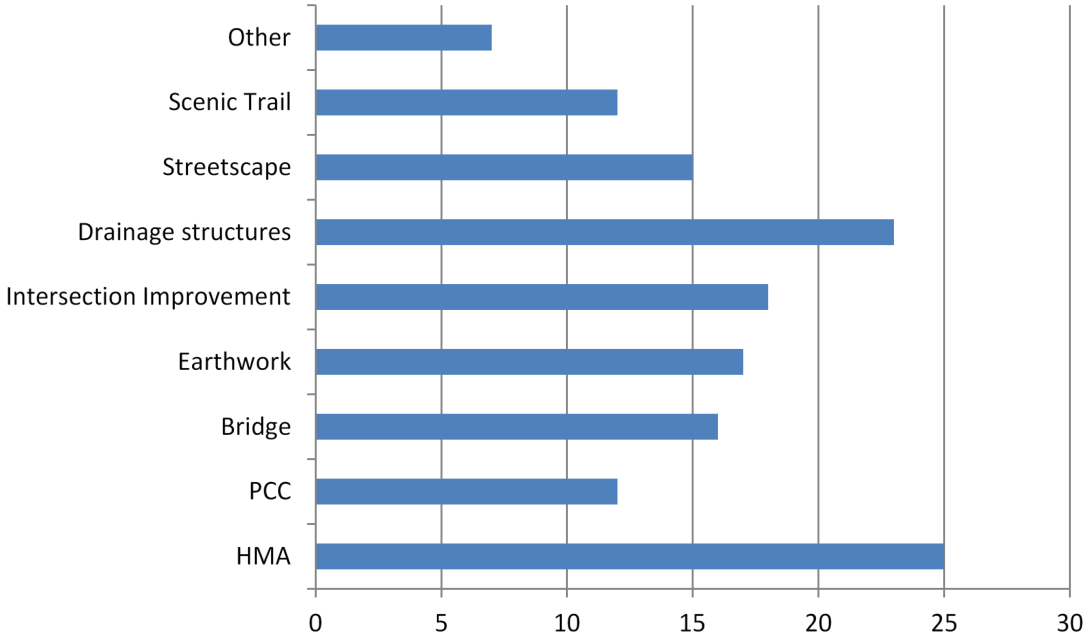


Figure 39. Bar Graph. Responses on what project elements are typically included in Federal-aid projects.

Estimate the percentage of project funds that are typically allocated to construction inspection and QA testing.

(out of 31 responses)

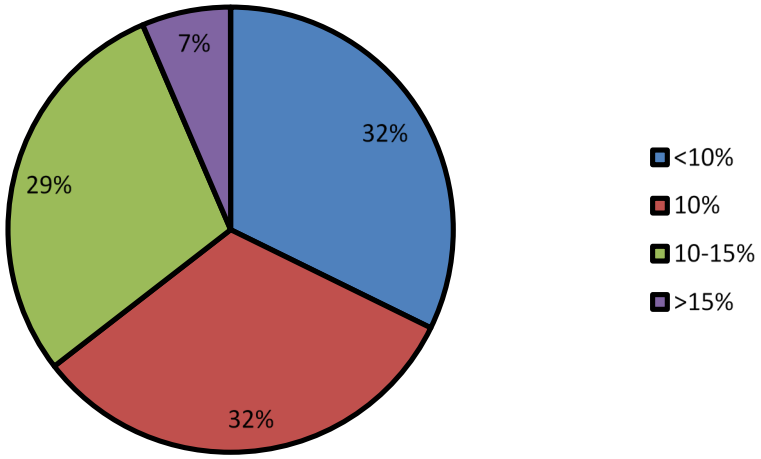


Figure 40. Pie Chart. Responses on the percentage of project funds typically allocated to construction inspection and QA testing.

Comments:

(AR) City inspection projects with overview of Engineer and Funding agency. Less than 1%

(CT) Town funded project <10% FHA funded project>30%

(FL) County CEI cost = 15% of Const. Contract Value -Contractor QC cost = 3-5% of Const. Contract Value -County QA cost = 25% of Contractor QC (County verifies 1 in 4)

How do you determine a project's materials sampling and testing needs?

(out of 32 responses)

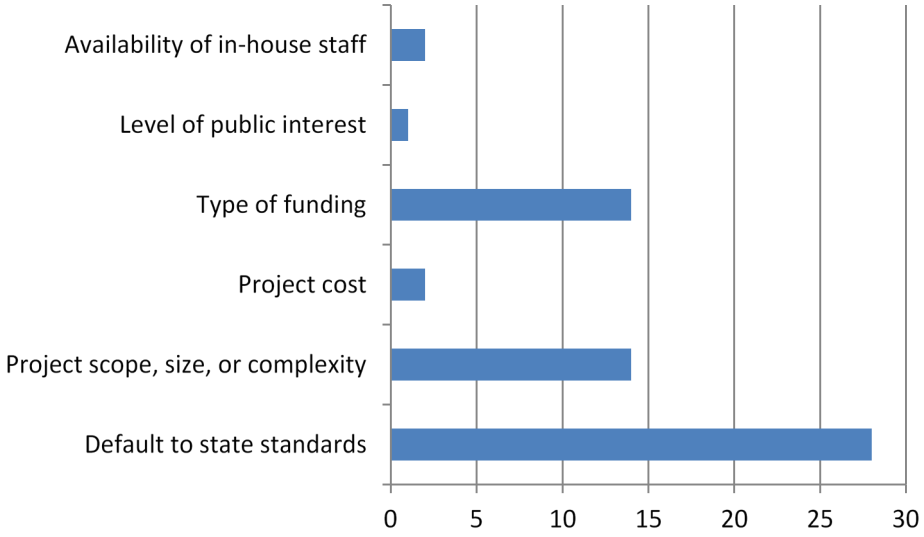


Figure 41. Bar Graph. Responses on how a project's materials sampling and testing needs are determined.

Who performs IA activities on a federally funded project?

(out of 32 responses)

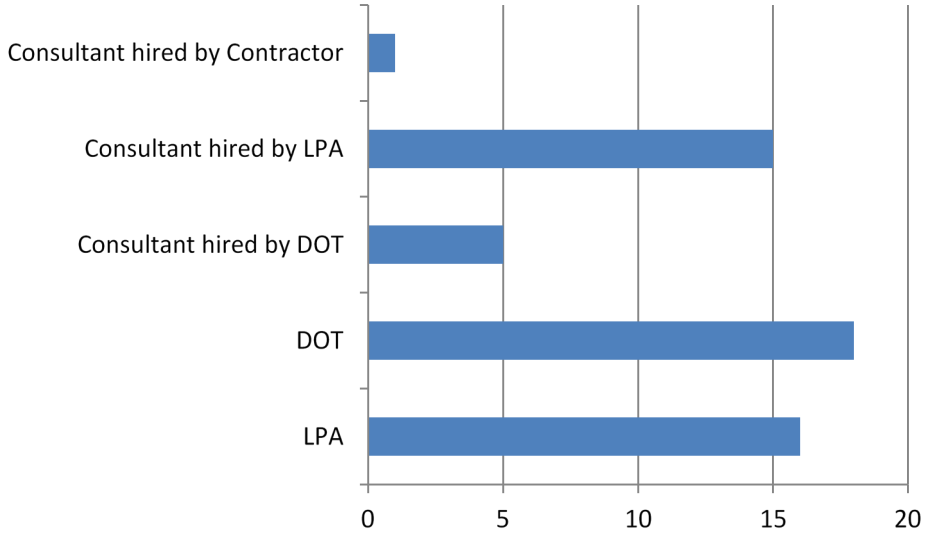


Figure 42. Bar Graph. Responses on who performs IA activities on a federally funded project.

Identify which construction phase QA activities your organization coordinates with the SHA.

(out of 32 responses)

Figure 43. Bar Graph. Responses identifying which construction phase QA activities are coordinated with the State transportation department.

Comments:

(City of Eugene, Oregon): Eugene is certified LPA. ODOT reviews the QA we perform for compliance with our own certified program.

(Sandy City, Utah): By a contracted consultant, all phases are coordinated.

(Wahkiakum County, Washington): Varies by project as we arrange with WSDOT, typically concrete girder fab is inspected by WSDOT.

Characterize the nature of the SHA's involvement in materials and construction inspections on your Federal-aid projects.

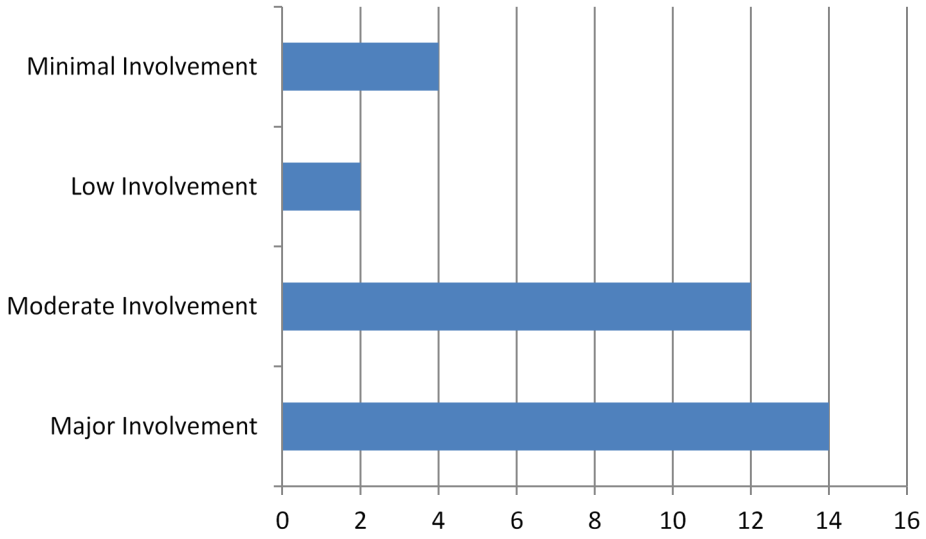


Figure 44. Bar Graph. Responses on the nature of the State transportation department's role in materials construction on Federal-aid projects.

Comments:

(Hillsborough County, Florida): DOT documents used as a standard for our projects. Plant certifications and FDOT representative is in contact throughout process.

(City of Lake Wales, Florida): We have never conducted a federally funded project.

(Linn County, Oregon): The level of involvement depends on the project type and size and also whether we are allowed to complete the project as a Certified Agency.

(City of Eugene, Oregon): Low involvement - DOT performs a final inspection and signs off on the quality documentation before the city sends final acceptance to the contractor

(Wahkiakum County, Washington): We are a certified acceptance agency, qualified to administer our projects, WSDOT role is low.

What level of MATERIALS TESTING do you typically apply for each of the following project types?

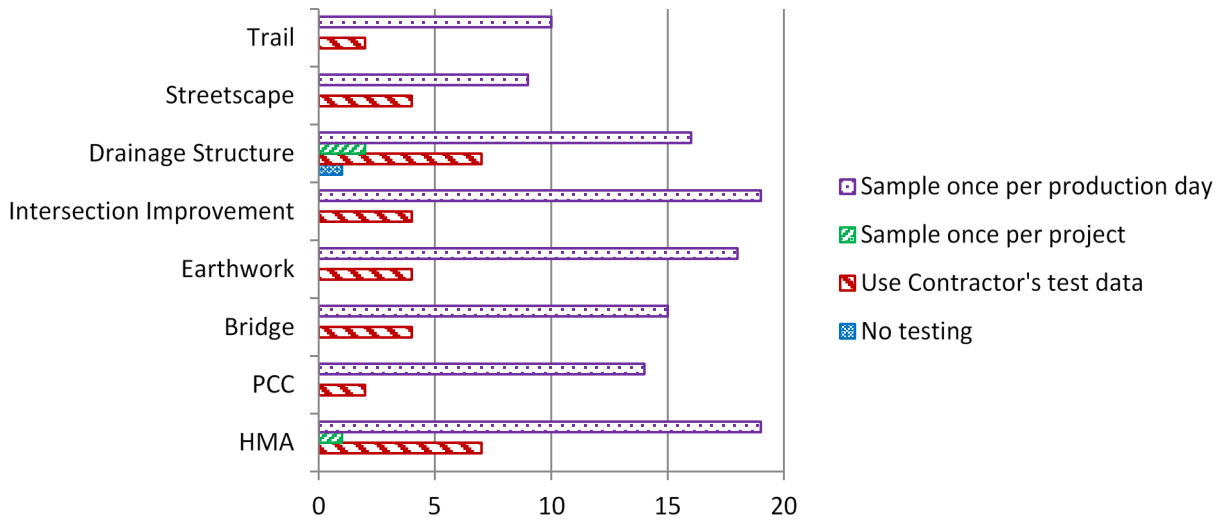


Figure 45. Bar Graph. Responses on the typical level of materials testing applied by project type.

Comments:

(City of Arkadelphia, Arkansas): Inspection level is a bit more complicated than this form allows responses for.

(Town of Darien, Connecticut): DOT inspector at plant, 3 consultant inspectors at site during construction.

(Hillsborough County, Florida): Detailed Field inspections also for ADA compliance projects, major rehabilitation for Limited Access NHS, and recreational facilities upgrades.

(Louisville, Kentucky): Most testing falls somewhere between once at the end and daily.

(Linn County, Oregon): This question is misleading and cannot be answered correctly with the options provided. Each component of the project is tested depending on type and size. This may require more than one test per day as well as using contractor's data and also no testing. It all depends on the requirement.

(Marion County, Oregon): QA testing is as specified.

(Sandy City, Utah): DOT reserves the right to test, but typically does not.

(Town of Ranchester, Wyoming): We also sample periodically during construction, but not daily.

What level of CONSTRUCTION INSPECTION do you typically apply for each of the following project types?

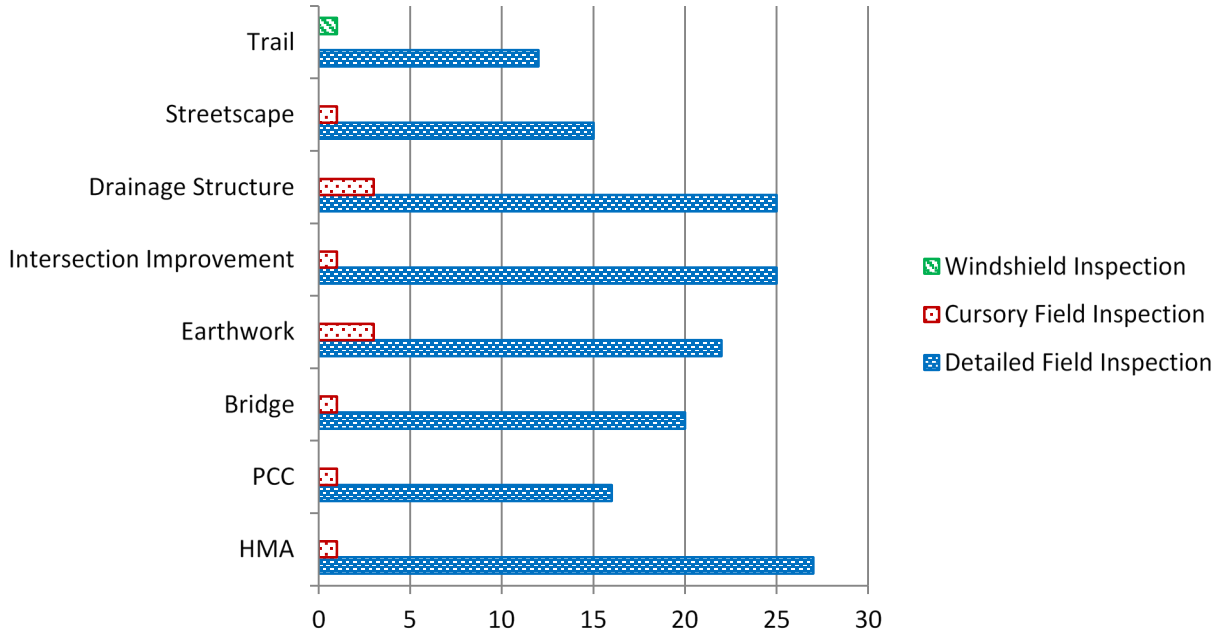


Figure 46. Bar Graph. Responses on the typical level of construction inspection applied by project type.

Comments:

(City of Arkadelphia, Arkansas): Inspection level is a bit more complicated than this form allows responses for.

(Hillsborough County, Florida): Detailed Field inspections also for ADA compliance projects, major rehabilitation for Limited Access NHS, and recreational facilities upgrades.

(Linn County, Oregon): We always closely oversee construction in the field as well as inspect and review and approve QC for materials testing and acceptance,

(City of Eugene, Oregon): Full time inspection on federally funded projects and has an inspection manual that details the process.

(Sandy City, Utah): A joint walk thru by LPA, DOT, consultant and contractor is conducted for final acceptance. Prior to that we inspect as needed at critical times, phases, components.

What types of tools could help your organization or other local agencies successfully perform materials QA and construction inspections on federally-funded projects?

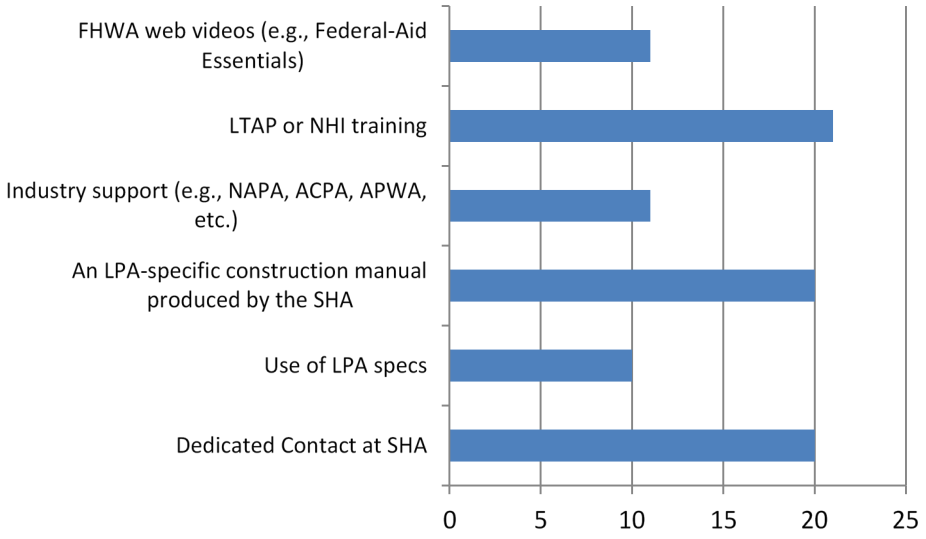


Figure 47. Bar Graph. Responses on tools used to perform materials QA and construction inspections on federally funded projects.

Comments:

(Hillsborough County, Florida): Follow-up procedure for addressing deficiencies. Our agency's application of these practices has resulted in significant reduction in frequency or impact of issues.

(Storey County, Nevada): We have always had a dedicated contact through NDOT, and they also have an LPA specific manual.

(Marion County, Oregon): Additional funds to cover the cost of comprehensive QA.

Does your agency employ any practices that have been successfully applied to mitigate challenges with QA on federally funded projects?

(County of Hawaii DPW): Training between inspectors; standardized procedures.

(Lincoln County, Nebraska): Weekly progress meetings with all involved in construction (State, Contractor, Construction Engineer, and LPA).

(Storey County, Nevada): County employed project management staff to oversee QA procedures.

(Linn County, Oregon): We submit for review and approval our written QA plan for each project to the State Agency. We require review and approval of the QA plan by the Agency of Oversight (E.g. State Agency). We have written QA plans for many projects.

(City of Eugene, Oregon): The certified local agency program has been a big help because we use our own practice.

(Marion County, Oregon): Combination of hiring consultants, training staff, and including warranty specs.

(Garfield County, Utah): We buy out federal funds for local.

APPENDIX K: INTERVIEW SUMMARIES

This appendix contains table 17, which summarizes the interviews with 11 State transportation departments that participated in the survey.

Table 15. Interview summaries.

General Program Information	Challenges/Issues with QA	Best Practices
California		

• The LPAs (Local Association of Governments) control the majority of the funding for local projects (75 percent through local taxes) and the remainder (25 percent) comes from State and Federal funds. This gives more control and influence by LPAs over local projects, whether using Federal funds or not.
• The use of specifications by LPAs in California varies. Generally in northern districts, Caltrans standard specifications are followed. In southern California, LPAs use the Green Book specifications. When an LPA uses Federal funds, it must follow the standard FAR requirements. Caltrans specifications reflect Federal requirements based on FHWA audits. LPAs are not required to use Caltrans specifications, but for the most part, LPAs use Caltrans specifications in the north and/or the Green Book in the south, and both are in full compliance with FHWA requirements.
• Caltrans specifications and requirements are used the same way whether for large or small asphalt projects.
• In 2002, Caltrans initiated specifications for LAPs but never carried this forward. Caltrans developed a QAP for local projects in 2008–2009.
• Local agencies vary considerably in terms of internal resources. For example, the City of Los
	• Both LPAs and Caltrans have had resource issues. District oversight was inconsistent because of resources (five Caltrans IA staff for local programs). There are 50 to 60 accredited laboratories. LPAs on average are very understaffed and experience turnover. Most LPAs use consultants to perform inspection and materials QA. Local projects cover not only roads but also water and sewer project.
	• Caltrans specifications are cumbersome in the sense that they use a one size fits all approach to QA for all projects. In particular, the frequency tables for testing are very complicated and hard to follow.
	• LPAs are required to put together a QAP to get Federal funding for projects and for the ARRA-funded projects; many agencies did not put together adequate QAPs or adequately adhere to the plan. Some of the common issues related to this program were the following:
	  ○ Inadequate frequency of testing in accordance with Caltrans specifications.
	  ○ Lack of testing documentation.
	  ○ Expense of testing (15 percent for CE of which part was for QA.
	• Caltrans has withheld funding or required retesting in one or two projects related to lack of material testing or lack of documentation deficiencies that required retesting.
		• Training and outreach are conducted for LPAs on how to develop and implement a QAP, and materials-related training.
		• QAPs should be tailored to fit the project profile. Caltrans recently worked with a small LPA (Morrow Bay), which hired a materials/testing consultant to develop a QAP for asphalt concrete for one project. The QAP included frequency tables for materials testing for asphalt concrete that were much simpler and easier to follow than the standard Caltrans frequency tables and reflected a lower frequency of testing. This QAP met Federal-aid requirements. Caltrans is now considering a modified QAP with simplified frequency tables for the following major materials categories:
		  ○ Earthwork (aggregates).
		  ○ Asphalt.
		  ○ Structural concrete.
		• Another justification for using less testing would be when better materials are sourced and provided for a project by the LPA.
		• Caltrans is also considering the use of a construction grading system for contract administration.

General Program Information	Challenges/Issues with QA	Best Practices
Angeles has its own testing laboratory and construction staff. The City of Fresno has 12 to 14 staff for capital construction. Smaller agencies may outsource all construction QA and inspection work to consultants. • LPAs are required to develop their own QAP for a project (or program) to get Federal funding.	• Generally, local programs office said that they were not aware of materials and construction quality issues. The issues are primarily related to compliance with construction QA testing and documentation requirements. • Other current issues relate to lack of materials certificates of compliance (e.g., project-specific welding signatures), and Buy America certification, which would lead to pulling Federal funds from project items. • The ARRA program caused some of the QA issues/risks because of the need to get to construction quickly. • Regarding certification of LPAs, Caltrans is not planning to implement at this time because of concerns about high turnover among LPAs, which presents a challenge for maintaining certification.	
Florida		
• FDOT has a formal LAP with a coordinator, and oversight of construction by district and Central Office materials staff. Two to 3 district staff may be responsible for overseeing approximately 30 to 45 active construction projects at any time. • FDOT maintains the Local Agency Program Information Tool (LAPIT) (essentially the manual of practice) and Laboratory Information Management System (LIMS) (FDOT's electronic materials management system). • The number of locally led projects varies by district. Eighty percent are off of the SHS. LPAs consist of MPOs (cities) and 17 counties. • LPAs use the FDOT LAP specifications for off-SHS projects, also called the "Big 4" specifications (for asphalt, concrete, earthwork, and landscaping). Big 4 specifications are less stringent for acceptance and closeout. Agencies	• Some LPAs consider the materials records online documentation (LIMS) to be excessive and cumbersome and feel that the process often delays final project closeout. • At the preconstruction meetings for on-SHS or critical elements, FDOT has identified cases of LPAs not following the FDOT specifications (full-blown or big 4). • The continual updates of the FDOT specifications occur at such a frequency that it is challenging for the LPAs to keep track of the changes. Agencies are alerted to changes in the FDOT specifications via once-a-week email alerts that local agencies need to sign up for. The frequency of changes to specifications is high, and these are not clearly and quickly communicated to the LPAs. An example was an asphalt and concrete trail that was bid with the FDOT 2010 specifications. However, by the time the project went to construction, there	• District 5 developed a QA Review Form that facilitates the QA reviews done once per month at a minimum on both on- and off-SHS projects. • District 1 creates the specification packages for the LAPs, which eliminates specification deviations for both on- and off-SHS projects. • District 1 conducts predesign walk-throughs (construction feasibility reviews, walkthrough of the project to be constructed) done with the LAP to identify issues early on before design. If it is an on-SHS or critical project, materials office is involved. • The FDOT LAP Community of Practice consists of districts, LPAs, and MPO representatives to discuss issues and recommend policy (e.g., move from

General Program Information	Challenges/Issues with QA	Best Practices
may use their own specifications for other components. • LPAs must use the full blown FDOT specifications for on-SHS or critical projects (e.g., bridges, culverts, or high dollar value). • Federal-aid off-SHS noncritical project types are typically sidewalk ADA, roadway widening, intersection safety improvements, signals and lighting, trails, and streetscapes projects. • FDOT uses certifications for LAPs and for inspector training (different levels based on whether on or off SHS). Materials training includes materials certification, LIMS, etc. • For on-SHS projects, FDOT performs laboratory IA testing on a programmatic basis. IA of field testing is more project-specific. • Some districts conduct quarterly coordination meetings with all LAPs to discuss all current and future projects. Others do random sampling of project documents for newer LAPs or if it is a complex project. • District materials looks for failing or nonstandard materials, lack of documentation (certification letters) or comparisons (for on-SHS projects) at closeout.	were sections of the specification that had been changed related to subbase. The local agency was not aware of this change, and the omission of subbase resulted in a multimillion dollar lawsuit. • Staff turnover at LPAs has been a challenge, which diminishes the effectiveness of annual training programs. • The LPAs would like to preserve as much funding for construction, often at the expense of testing and inspection. Funding includes verification testing but the LPAs often request to not to do the testing, or they reduce the testing frequency below what is required in the FDOT specifications. • Although most of the identified QA issues relate to insufficient sampling frequency, FDOT has noted some occurrences of defective material. If defective material is encountered, the LAP has to contract with a third-party laboratory and provide a resolution testing and engineering analysis report.	Marshall to super pave mix design).
Maine		
• MaineDOT maintains an LPA manual. • QA requirements are based on and refer to MaineDOT standard specifications and manuals. • Central Office and district staff are responsible for overseeing LPA projects—oversight typically consists of two to three site visits, including preconstruction and final inspection/closeout. • LPAs include municipalities (towns and cities). There is no county road system in Maine (similar to New Hampshire).	• One city recently took a part-time approach to inspection and testing. There were materials issues and MaineDOT stepped in and performed the testing. Some of material had to be removed and replaced. • For years, no IA was performed for LPA projects. This has improved—MaineDOT has two staff engaged on statewide IA. • Consultant laboratories are generally not as good as MaineDOT laboratories. • LPAs could improve documentation for LPA projects (sometimes QA documentation is	• Training LPA staff on QA requirements. • Attendance at preconstruction/pre-paving meetings (communication is important). • Regular communication between LPA staff and MaineDOT IA staff. • MaineDOT performing HMA laboratory testing for LPAs. • Headquarters staff assigned to LPA oversight.

General Program Information	Challenges/Issues with QA	Best Practices
• Most LPA projects are small scale (less than $500,000) single season projects, including sidewalks, trails, ADA, etc. • Larger cities have a few pavement preservation or rotary projects (e.g., Bangor Airport Rotary). No bridges are included in the LPA program. • Occasionally LPA projects involve local or other standard specifications (e.g., Casco Bay terminal district used American Institute of Architects standards). One or two cities have their own specifications. • MaineDOT has a two-tier certification process, which is explained in its LPA manual. • Larger cities have engineering staff but most LPAs often use consultants (often former MaineDOT employees) for CEI. • For HMA paving projects, the LPA will sample and MaineDOT will test all hot mix. For paving, MaineDOT requires that LPA and contractor personnel attend a pre-paving meeting.	lacking). • Cost to meet ADA is an issue with LPAs. One LPA was found to be noncompliant and eliminated the ADA portion as a solution.	
Missouri		
• MoDOT has a $120 million Local Program, including a $15 million Enhancement Program, and a $20 million Bridge Program (selected from deficient bridges) and $65 million for large cities, ITS, streetscapes, and anything else. Highest percentage of projects is less than $500,000. • The local program includes MPOs, cities, and counties. The counties own most of the non-Federal-aid system. • MoDOT oversight of QA process includes at preconstruction and after first invoice, periodic field visits after Notice To Proceed, major bridge pours, and the final inspection. • MoDOT has 3 dedicated staff for LPA in the Central Office, along with 25 district project	• Two years ago, MoDOT implemented 4-h basic training. • Missing inspection diaries (no records). • There needs to be a clarification of expectations in the LPA manual. • There are closeout challenges. • Use of consultants on smaller projects—consultants must be qualified. • Having consultant for QA oversight.	• The LPA manual was rewritten 2 years ago in a user friendly format with how-to tutorials for diaries, materials testing, etc. • Checklists. • Having a certification program available for LPAs along with training as well. • FHWA essentials addressing QA. • Compliance Assurance Program (CAP)—reviews of CAP show vast improvement in terms of QA. • Buyback program—advantage to LPAs trading state money for Federal money to avoid/minimize Federal requirements. • LPAs own project and are responsible for Federal aid.

General Program Information	Challenges/Issues with QA	Best Practices
managers who have access to district staff. • IA and inspectors are trained and certified and qualified to do the work being performed. • Audit—Independent tests are performed to spot-check if there is a problem. • The larger cities use their own staff for QA that are LPA certified. • On the State side, MoDOT is moving to use of a Quality Management Program (QMP), and contractor QC testing—QC testing is perceived as a savings. • MoDOT can reduce staff by 20 percent when using QMP and that is perceived as a savings on the project.		
New Hampshire		
• Each LPA project is assigned an NHDOT project manager. Each project manager could be responsible for 20 to 100 projects. • Typical LPA projects are in the $400,000 to $500,000 range. One exception is the intersection improvement project, City of Claremont's Draper's Corner ($3 million project). • Typical LPA projects include TE, CMAQ, Safe Routes to Scholl, National Historic Covered Bridge program, Off-System Bridges program, STP, Transportation, Community and System Preservation Program, earmarks, and Highway Safety Improvement Program. • Some bigger urban areas (e.g., Concord, Manchester, Nashua, etc.) have projects every year, whereas more rural towns will have projects less frequently (e.g., every 5 years, and these go through the regional planning offices). • LPAs are required to use the NHDOT specifications book. • Sampling frequency is part of the highway construction manual. IA requirements are	• LPAs feel that the cost of construction engineering, including the CEI and testing consultants, is increasing in steps and is becoming a significant portion of the project cost. • On small projects (e.g., sidewalk), LPAs often feel that the required full-time presence of a CEI tester is excessive and are concerned that the cost of consultants are taking away from the construction budget. • LPAs noted that while the current training is helpful, it would be beneficial to have training targeted to specific topics. • One LPA noted that the record-keeping process can be overwhelming with consultants that have no prior experience with Federal-aid projects. • Although NHDOT felt that LPA projects generally had few QA problems, one pedestrian bridge project was highlighted as an example of a project that did not meet requirements. The LPA could not produce weld certifications for the prefabricated	• LPA manual provides guidance on the development of QA plans. The manual also addresses, and shows by example, what is needed for closeout, materials records, etc. • LPAs are required to have a full-time inspector.

General Program Information	Challenges/Issues with QA	Best Practices
reduced because there are generally lesser quantities of materials on a typical LPA project. Acceptance testing is similar to NHDOT projects. • LPAs must use NHDOT mix designs • Two or three NHDOT staff will handle IA for the LPA projects. (NHDOT takes a systems-based approach to IA.) • LPAs engage consultants to prepare the contract, plans, and specifications. Consultants are directed to stay as close as possible to them.	structure, and had to instead, at significant additional cost, retain an expert to later verify the adequacy of the welds.	
Ohio		
• ODOT's Central Office has a staff of four people to oversee the entire LPA program. • At the district level, someone is assigned to help the LPA manage the process during the planning stage. During the construction phase, construction monitors oversee documentation and ensure everything is proceeding correctly. • Construction monitors attempt to visit the site at least once a month (for a simple project) to oversee construction. For more complex projects, the monitors visit more regularly. • According to ODOT's LPA manual, the LPA needs to adhere to the same ODOT QA requirements as used on a State-administered job. • Bigger cities and counties (e.g., Columbus) maintain their own specifications; however, the district reviews all LPA specifications. • ODOT will let and provide construction administration/materials testing for projects sponsored by LPAs that have insufficient staffing or experience according to the ODOT's assessment.	• ODOT was hard-pressed to identify problems with the current LPA program with respect to construction QA. One problematic project was mentioned, but ODOT noted that the issues were identified early in the project, and the District recognized that LPA required additional guidance and oversight. • ODOT did acknowledge that complying with IA requirements can be challenging for the smaller LPAs. (ODOT's IA program does not cover LPA projects.)	• Each district conducts an annual LPA training at which district personnel discuss requirements, documentation, etc. All LPAs in the district are invited to attend. ODOT is working toward making attendance at such training sessions a mandatory requirement for all LPAs. • At end of a project, ODOT evaluates LPAs on certain areas. Information is recorded in a historical log (not scored, more adjectival) of that LPA's performance on past projects. If the LPA has a poor record, ODOT will grant the LPA access to Federal money but will administer the project using ODOT staff. ODOT will slowly let the LPA get back into the program by administering small, simple projects. • ODOT conducts annual partnering reviews with LPAs at which the following topics are discussed: the ease/difficulty of administering Federal-aid projects (from contract administration to construction), issues encountered, and lessons learned. • Six of these partnering reviews are done annually. ODOT selects which agency to review using a risk-based approach that considers how much work the LPA has

General Program Information	Challenges/Issues with QA	Best Practices
		done and how much is in the pipeline. Even though only six agencies are reviewed in a given year, the issues and lessons learned inform ODOT's policy and approach to all LPA projects moving forward.
Oregon		
• The LPAs keep very rigorous records. • The LPAs are required to follow the Oregon DOT construction management manual. • Oregon DOT region experts verify all of the information. • Oregon DOT lets the certified LPAs administer a bulk of the total projects. • Region assurance experts perform reviews of 100 percent of jobs and 100 percent of bids. • A construction liaison unit visits a project at least two or three times during the duration. • The construction liaisons make it out to every project. • Mostly bridge and other pedestrian type projects are completed using Federal funds while most LPAs perform paving on their own without Federal funds. • The inspectors are required to be certified. • Some of the larger LPAs have their own qualified inspectors and material testers while the others retain consultants.	• No formal FHWA audits are being performed. • The same construction reports are being done, and none of them are done specifically. • There are certain consultants and agencies that are not as good as others.	• There is a good line of communication between all parties. • There is a training program available for a nominal price as well as certification classes. • The annual recertification process requires completion of written, oral, and hands-on elements.
Pennsylvania		
• The main types of Federal-aid projects that the LPAs of PennDOT administer are bridges, streetscapes, rails to trails, and road reconstruction.	• Archaic payment processes are used where estimates must go through a maze of approvals, and contractors end up having to wait a minimum of 8 to 12 weeks or as long as 6 months. • Using PennDOT Pub. 408 and other local specifications can be challenging at times when it comes to "odd" items such as benches, trash receptacles, street light poles, traffic signal head colors, bollards, etc.	

General Program Information	Challenges/Issues with QA	Best Practices
	• Receiving the manufacturer's specifications and then moving through the review and approval process can lead to schedule delays. • QA really has not been a problem they have encountered. • The PennDOT Central Office should require invoice approvals though the Engineering and Construction Management System process to ensure prompt payments to contractors and suppliers. • When field questions arise regarding QA during projects, they are dealt with on a case-by-case basis and they seek technical support from others in the District or Central Office as necessary.	
Virginia		
• VDOT LAP program has 200 projects advertised at close to $600 million. • Project Coordinators (from VDOT districts) manage/oversee 40 to 80 LPA projects, drawing on technical expertise from ROW, design, construction, and environmental as necessary to assist with developing scope, schedule, and estimates. • Districts are not all the same in terms of LPA make-up and organization. • VDOT has a formal process (application form) that LPAs must complete for every Federal-aid project they seek to administer. VDOT uses it to evaluate whether the locality has suitable capabilities to administer that particular Federal-aid project. (VDOT also has a more rigorous certification whereby cities qualified under the Urban Construction Initiative Program may seek even greater autonomy in administering their capital programs. To date, only one locality—Virginia Beach—has received the certification.	• VDOT's risk-based approach to project oversight theoretically provides a rational way to optimize resources. However, one of the localities interviewed found that VDOT inspectors are often unclear on which level of oversight applies to various projects and tend to apply the more rigorous standards to all projects. • VDOT's standards and manuals are primarily geared to prime new roadways. The projects undertaken by urban localities, however, often have very different needs and complications. VDOT monitors can be unfamiliar with the nuances of undertaking urban work. • Specifications and manuals are not geared to the type of small projects often performed by LAPs. (For example, pedestrian bridges are to be designed and constructed to highway infrastructure standards.) • Communication with VDOT could be improved, especially if VDOT will be charging	• Project-by-project qualification of LPAs to determine whether the locality has suitable capabilities to administer a particular Federal-aid project provides both VDOT and LPA insight into the locality's true capabilities at any given point in time given current staffing resources. • VDOT has a compliance assessment program that annually selects a number of representative LAPs that are evaluated to ensure compliance with State and Federal laws and regulations, including those related to materials QA. Results from these project assessments are used to target needed training and guidance for the LAP program. • The LPAs must hire VDOT prequalified contractors for Federal-aid projects. • LPAs must include with all reimbursement requests a statement certifying that they have complied with various requirements, including that "all materials used on the

General Program Information	Challenges/Issues with QA	Best Practices
• No consultants are used by VDOT for LPA oversight (some discussion about changing this practice). LPAs use consultants for CEI. • For construction phase, area VDOT construction engineers conduct inspection and review invoices for Federal-aid compliance. • Every project is different. Some projects need more upfront work. Level of inspection varies. Use risk-based approach to determine level. For example a simple sidewalk inspection occurs only at beginning and end. • More complex projects require more record keeping, CEI consultant inspectors with the right certifications for inspectors/testing. Requires training. • By Virginia code, VDOT is responsible for construction and maintenance programs if using State-aid monies. Verification subject to audit based on perceived risk.	time to the LAP for overseeing the project. • LAP manual should be updated with the current forms. • There have been issues with CEI consultants having deficient testing equipment (broken air meters and nuclear density gauges) and poor test inspectors. • The localities interviewed were unsure whether IA was conducted on their projects. (VDOT expects LPAs to perform their own IA unless they request the State to step in and perform this function at a cost to the project.) • Contractors are often unaware of the explicit QC responsibilities assigned to them in the contract. • It can be challenging to marry VDOT and LPA procedures, particularly for sophisticated urban localities that must satisfy numerous stakeholders.	project meet applicable FHWA and VDOT requirements, as applicable to Federal-aid and VDOT maintained projects." One VDOT area engineer felt that the inclusion of this statement helped highlight to the locality the importance of materials quality.
Washington		
• WSDOT works with cities, counties, ports, and tribes among others. • There is a certified acceptance agency that has about 100 programs under the CA program. However, in total, they deal with about 300 agencies or tribes through this program. • For non- CAs, WSDOT enters into an agreement that addresses all of the roles and responsibilities. • WSDOT has a headquarters QA unit, but most of the project-by-project work is handled by the respective WSDOT regional office. • There are six regions that provide the oversight and technical assistance to the projects. • With the CA program, WSDOT conducts interviews with the LPAs. • The LPA has to do a pilot project to gauge how	• The WSDOT QA/QC is way too over the top for the typical LPA project.	

General Program Information	Challenges/Issues with QA	Best Practices
well they perform. • Every 3 years, WSDOT will do a review of LPA documents for a recent Federal-aid project. • Some consultant laboratories are used for testing outside of the State ones. • The Local Agency Guidance Manual used incorporates and references the Construction Manual. • The level of oversight varies by project depending on the complexity of that project. • About 75 percent of the LPAs use consultants. • The projects are usually less than $500,000. • If issues are encountered on a project, the LPA has to submit a corrective action report. • For non-CA LPAs, it might be required that they hire a consultant project manager or a CA LPA may manage the project for a non-CA. • There is a different monetary value threshold for change order approval with full versus non-full Federal oversight projects. • The FHWA may review the testing records for a full oversight project.		
Wisconsin		
• Wisconsin has 1,900 LPAs statewide. The make-up of LPA projects includes towns and villages, county roads, local city projects, local bridge program, and City of Milwaukee ($3 to $5 million per year). • WisDOT requires LPA projects to follow State specifications for QA—specifications do not vary. • WisDOT implemented an MC program statewide in 2006 (first piloted in 1996) to assist WisDOT with administration and oversight of LPA construction. • The MC program provides oversight for design, construction, and QA.	• There is no required number of tests per General Special Provisions in place at this time. • The less experienced consultant staff needs to be certified. • Following the proper procedure for QMP has proven to be a challenge. • Consistency of MC management practices needs improvement. • Communication up the chain to WisDOT has proven to be a challenge because of the time frame for decision-making for QA. • Downsizing within WisDOT has resulted in losing dedicated staff and an increase in staff	• WisDOT believes MC program has worked well and plans to continue to use MCs. One LPA commented that the program has worked very well with the same MC since 1992. WisDOT also plans to hire new WisDOT staff and transition them into LPA the program in the same role that MCs perform. • WisDOT improvement plans include the following: ○ Create an LPA certification program to allow LPAs greater control and autonomy. ○ Institute a new document and plan

General Program Information	Challenges/Issues with QA	Best Practices
• WisDOT requires contractor to do QC, and MC performs quality verification. • Consultants are also used for CEI and are directly hired by WisDOT (not LPAs). • There is a QMP program in place, and consultants must be certified to participate in QMP program. • IA is done strictly by the WisDOT. • WisDOT has a guide for the nontraditional projects. • WisDOT has certification requirements and programs for LPAs. • WisDOT thinks MC program has improved compliance with Federal requirements but there is room for improvement in consistency. • An LPA urban county commented that it typically enters into a three-party contract with WisDOT and MCs to administer projects. Project types include bridges, Highway Safety Improvement Program projects, and Surface Transportation Program projects. • Smaller projects have less QA/QC in place. • The LPAs in Wisconsin hire their own design consultants, with guidance from WisDOT. • The WisDOT/MC administers construction, hires the construction consultants, hires contractors, and handles all billing and changes. • The county staff does site visits, change order signoff, and anything that affects the 20 percent that is local funds. • District 1 and 2 used MC program in 1992—(small rural projects).	turnover. • The CEI consultants feel that the MCs are too nitpicky and heavy-handed—not much flexibility at all. • The required FHWA audit tests or test according to QMP are not always getting done. • The LPAs are very frustrated with the project reporting requirements. • The MC's customer is WisDOT, not LPA although the LPA is paying part of the cost. • Dealing with the permitting agencies is horrible. • ACEC (Engineers) said that there are conflict of interest issues with consultants overseeing consultants. • Some LPAs also viewed MC program as a conflict of interest. • Recommendations for stakeholder group: ○ Communication within the MCs needs much improvement. ○ There needs to be a review of MCs and LPAs to make them as efficient as possible. ○ The use of WisDOT Facilities Development manuals needs to be more applicable to local projects. ○ There needs to be improvements in the communication as well as the training for the projects being performed.	review process. ○ Institute training on MC scope versus LPA responsibilities. ○ LPA standards committee to create standards for local programs to make standards more applicable to LPAs. ○ Improve MC collaboration and develop an LPA consultant contracting and administration guide. ○ Institute MC teleconferences to discuss best practices for design and construction oversight. ○ Use face-to-face meetings with WisDOT and MC staff in regions to discuss issues and best practice. ○ Every 2 months, hold stakeholder meetings with WisDOT, FHWA, LPAs, consultants, and contractors. ○ Promote EDC goals: 1) stakeholder meetings, 2) use of consultants, and 3) LPA certification. ○ WisDOT to hire new staff and provide training for LPA oversight. ○ Create LPA education programs so that the LPAs will be more prepared with each project. ○ WisDOT will support an LPA certification program to empower the LPAs.

FAR = Federal Acquisition Regulation
TE = Transportation Enhancement
CMAQ = Congestion Mitigation and Air Quality
STP = Surface Transportation Program

APPENDIX L. SUMMARY OF FEDERAL REQUIREMENTS FOR NHS, NON-NHS, AND SERVICE CONTRACTS ("CONSTRUCTION: CONTRACT ADMINISTRATION, FEDERAL REQUIREMENTS SUMMARY," 2009)

This appendix summarizes Federal requirements for NHS, non-NHS, and service contracts. For each subject area, references are provided for the United States Code, the Code of Federal Regulations, and/or other applicable laws. Applicability to NHS, non-NHS, and non-highway construction (or service contracts) and any additional remarks are also presented.

Table 16. Summary of Federal requirements for NHS, Non-NHS, and service contracts.[28]

Subject	USC	CFR	Other Laws	Applicability			Remarks
				Construction Contracts		Non-Highway Construction or "Service Contracts"*	
				NHS	Non-NHS		
Prohibition Against Use of Local Hiring Preferences (FHWA-1273—Sec 1–6)	—	635.117(b)	—	Yes	Yes	No	—
Prohibition Against the Use of Convict Labor (FHWA-1273—Sec 1–6)	23 USC 114(b)	23 CFR 635.117(a)	—	Yes	Yes**	No	**Prohibition only applies to projects on Federal-aid highways
Nondiscrimination (FHWA-1273—Sec II)	23 USC 140, 23 USC 324, 49 USC 322, 42 USC 12101–12213, 42 USC 3601–3619	23 CFR 200, 23 CFR 230D, 23 CFR 635.17 28 CFR 35 29 CFR 1630 41 CFR 60 49 CFR 21, 23 28 CFR 50.3 49 CFR 25	*The Civil Rights Act of 1964, Title VI *The Age Discrimination and Employment Act of 1967 *The Age Discrimination of 1975 *The American Disabilities Act of 1990	Yes	Yes	Yes	All contracts and subcontracts of $10,000 or more
Non-segregated Facilities (FHWA-1273—Sec III)	—	23 CFR 633A 41 CFR 60.1.8	Title VI	Yes	Yes	Yes	All contracts and subcontracts of $10,000 or more

Subject	USC	CFR	Other Laws	Applicability			Remarks
				Construction Contracts		Non-Highway Construction or "Service Contracts"*	
				NHS	Non-NHS		
Payment of Predetermined Minimum Wage (FHWA-1273—Sec IV)	23 USC 113, 40 USC 276 (a) & (c)	23 CFR 635, 309(f), 29 CFR 1, 3, 5	Davis-Bacon Act Copeland Anti-Kickback Act	Yes	**	**	**All Construction contracts on a Federal-aid Highway exceeding $2,000
Statements and Payrolls (FHWA-1273—Sec V)	40 USC 276 (a) & (c), 18 USC 874	23 CFR 635.118 29 CFR 3, 5	Davis-Bacon Act Copeland Anti-Kickback Act	Yes	**	**	**Same as above
Record of Material, Supplies and Labor (FHWA 47) (FHWA-1273—Sec VI)	—	23 CFR 635.126	—	**Yes	No	No	**Applies to NHS projects > $ 1 million (excl. FA, Beaut, RR etc.)
Subletting or Assigning the Contract (FHWA-1273—Sec VII)	—	23 CFR 635.116	—	Yes	No	No	—
Safety: Accident Prevention (OSHA compliance) (FHWA-1273—Sec VIII)	40 USC 333	23 CFR 635.108 29 CFR 1926	OSHA	Yes	Yes	Yes	All construction projects
False Statements Concerning Highway Projects (FHWA-1273—Sec IX)	18 USC 1020	23 CFR 633A, 23 CFR 635.119	—	Yes	Yes	Yes	All construction projects
Implementation of the Clean Air Act and Federal Water Pollution Control Act (FHWA-1273—Sec X)	33 USC 1251 42 USC 1857	23 CFR 633A 40 CFR 15	—	Yes	Yes	Yes	All contracts and subcontracts of $100,000 or more

Subject	USC	CFR	Other Laws	Applicability			Remarks
				Construction Contracts		Non-Highway Construction or "Service Contracts"*	
				NHS	Non-NHS		
Certification Regarding Debarment, Suspension, Ineligibility, and Voluntary Exclusion (FHWA-1273—Sec X1)	—	23 CFR 635.112(g) 49 CFR 29	—	Yes	Yes	Yes	Contracts and subcontracts of $100,000 or more
Certification Regarding the Use of Contract Funds for Lobbying (FHWA-1273—Sec X11)	49 USC 322A	23 CFR 635.112(g) 49 CFR 20 49 CFR 29	—	Yes	Yes	Yes	Contracts and subcontracts exceeding $100,000
Appalachian Contract Employment Preference	40 USC Appendix 201	23 CFR 633B	Appalachian Regional Development Act	**	**	**	Only APD funded contracts
Buy America	STAA Section 165 ISTEA Section 1041(a) & 1048(b)	23 CFR 635.410	—	Yes	Yes	**Yes	**All projects funded under Title 23
Disadvantaged Business Enterprise	23 USC 140(b)	23 CFR 200 & 230B, C, D 49 CFR Part 26 (DBE) 49 CFR Part 21 (Title V1)	—	**Yes	**Yes	**Yes	**Applicable as necessary to meet State DBE program goals
Indian Preference on Federal-aid Projects (Labor & Employment)	23 USC 140 42 USC 2000e-2i	23 CFR 635.117	—	**	**	**	**Any project meeting "guidance criteria" (see text)
Non-Collusion Certification	23 USC 112	23 CFR 635.112(f)	—	Yes	Yes	No	—
On-the-Job Training	23 USC 140(a) & (b)	23 CFR 230A	—	Yes	**	**	**Projects designated by STA in setting State goals
Standardized Changed Conditions Contract Clauses	23 USC 112(e)	23 CFR 635.109	—	Yes	Yes	No	—

Subject	USC	CFR	Other Laws	Applicability			Remarks
				Construction Contracts		Non-Highway Construction or "Service Contracts"*	
				NHS	Non-NHS		
Drug-Free Workplace	—	49 CFR 29	—	**	**	**	DFW certification applies to direct recipients (not construction contractors)
Publicly Owned Equipment	—	23 CFR 635.106	OMB Circular A-87	Yes	Yes	No	—
Contractor Purchased Equipment for State Ownership	23 USC 302	23 CFR 140 49 CFR Part 18 49 CFR Section 18.3		Yes	Yes	No	—
Equipment Rental Rates	—	48 CFR Part 31	OMB Circular A-87 FAPG NS 23 CFR 635.120	Yes	Yes	No	—
Foreign Contractor and Supplier Restriction	—	49 CFR 30	—	Yes	Yes	No	—
Prohibition Against Convict Produced Materials	23 USC 114(b) (2)	23 CFR 635.417	—	Yes	**	No	** Prohibition only applies to projects on Federal-aid highways
Patented/ Proprietary Products	23 USC 112	23 CFR 635.411	—	Yes	Yes	No	—
State Preference	23 USC 112	23 CFR 635.409	—	Yes	Yes	No	—
State Owned/ Furnished/ Designated Materials	23 USC 112	23 CFR 635.407	—	Yes	Yes	No	—
Public Agencies in Competition with the Private Sector	23 USC 112	23 CFR 635.112(e)	—	Yes	Yes	No	—
Salvage Credits	—	49 CFR 18.36	—	Yes	Yes	No	—
Warranty	—	23 CFR 635.413	—	Yes	No	No	—
Alternate Bids	—	23 CFR 635.411(b)	—	Yes	No	No	—
Incentive/ Disincentive Clauses	—	23 CFR 635.127(d, f)	—	Yes	No	No	—

Subject	USC	CFR	Other Laws	Applicability			Remarks
				Construction Contracts		Non-Highway Construction or "Service Contracts"*	
				NHS	Non-NHS		
Standard Specifications and Plans	—	23 CFR 630B	—	Yes	No	No	—
Engineer's Estimate	—	23 CFR 630B	—	Yes	No	No	—
Method of Construction (low bid for construction contracts)	23 USC 112(a) & (b)	23 CFR 635.104 49 CFR 18.36	—	Yes	Yes	No	—
Owner Force Account/Cost Effective Justification	—	23 CFR 635B	—	Yes	Yes	No	—
Bonding and Prequalification	—	23 CFR 635.110	—	Yes	Yes**	No	**See limitations in text
Advertising for Bids	23 USC 112	23 CFR 635.112(d) (e) (f) (g) (h), 49 CFR 18.36	—	Yes	**	No	**See limitations in text
Bid Opening and Tabulation	—	23 CFR 635.113(a)	—	Yes	**	No	**See Text
Bid Analysis and Award of Contract	23 USC 112	23 CFR 635.114	—	Yes	**	No	**See Text
Contract Time	—	23 CFR 635.121	—	Yes	No	No	—
Change Orders	—	23 CFR 635.120-121	—	Yes	No	No	—
Claims	—	23 CFR 635.124	—	Yes	No	No	—
Liquidated Damages	—	23 CFR 635.127	—	Yes	No	No	—
Progress Payments	—	23 CFR 635.122	—	Yes	No	No	—
Project Supervision and Staffing	23 USC 114 & 302	23 CFR 635.105	—	Yes	Yes	No	—
Subcontracting	—	23 CFR 635.116	—	Yes	No	No	—
Suspension and Debarment	—	49 CFR 29	—	Yes	Yes	Yes	—
Termination of Contracts	—	23 CFR 635.125	—	Yes	No	No	—

Subject	USC	CFR	Other Laws	Applicability			Remarks
				Construction Contracts		Non-Highway Construction or "Service Contracts"*	
				NHS	Non-NHS		
Audits	23 USC 112(b) (2) (c)	49 CFR 18.26; and 48 CFR 31, Federal Acquisitions Regulation	OMB Circular A-133	Yes	Yes	Yes	—
Records Retention	—	49 CFR 18		Yes	Yes	Yes	—

*Service contracts are generally contracts which do not conform with the definition of "construction" in 23 USC 101(a)(3) and are not considered to be engineering service contracts subject to 23 CFR 172. Certain intelligent transportation system projects may be considered to be service contracts if they do not "... directly facilitate and control traffic flow" (excerpt from the definition of "construction"). Non-highway construction contracts may include Transportation Enhancement Projects which are not located on highway right-of-way and are not linked to a Federal-aid highway project (i.e. the project would not exist without another Federal-aid project). Examples include bicycle trails, historic preservation, railroad station rehabilitation projects, etc. (See Mr. Ptak's November 12, 1996 memo at http://www.fhwa.dot.gov/programadmin/contracts/111296.cfm.)

— Indicates not applicable.

USC = United States Code

OSHA = Occupational Health and Safety Administration

STAA = Surface Transportation Assistance Act

ISTEA = Intermodal Surface Transportation Efficiency Act

DBE = Disadvantaged Business Enterprise

DFW = Drug-Free Workplace

OMB = Office of Management and Budget

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