Construction Peer Network National Synthesis Report

National Trends in Highway Construction Program and Project Delivery

July 2014

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AASHTO The Voice of Transportation

AGC of America The Associated General Contractors of America Quality People. Quality Projects.

ARTBA American Road & Transportation Builders Association

U.S. Department of Transportation Federal Highway Administration

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List of Acronyms

AASHTO	American Association of State Highway and Transportation Officials
AGC	Associated General Contractors of America
ARTBA	American Road and Transportation Builders Association
CM/GC	Construction manager/general contractor
CIM	Civil Integrated Management
CPN	Construction Peer Network
DTM	Digital terrain model
DOT	Department of transportation
DRB	Dispute resolution board
EDC	Every Day Counts
FHWA	Federal Highway Administration
ICST	Intelligent Construction Systems and Technologies
MAP-21	Moving Ahead for Progress in the 21st Century
MIT	Magnetic imaging technology
NCHRP	National Cooperative Highway Research Program
NEAUPG	North East Asphalt User/Producer Group
NEPA	National Environmental Policy Act
NHI	National Highway Institute
OSHA	Occupational Safety & Health Administration
PI Tool	Program Information Tool
QA	Quality assurance
QC	Quality control
RFID	Radio frequency identification device
SHRP II	Strategic Highway Research Program II
VECP	Value engineering change proposals

EXECUTIVE SUMMARY

In partnership with the American Association of State Highway and Transportation Officials (AASHTO), the Associated General Contractors of America (AGC) and the American Road & Transportation Builders Association (ARTBA), the Federal Highway Administration (FHWA) initiated the Construction Peer Network (CPN) in the fall of 2011. The goal of the CPN project was to support the widespread deployment of proven and exemplary construction practices through peer exchanges among field practitioners.

The CPN used a structured approach to identify, capture, and share today's most effective highway construction practices with the objective of improving quality, reducing costs, and optimizing project duration to reduce impacts. It was also intended to benefit State DOTs and the contracting community by providing State DOTs with options for maximizing limited resources and developing or enhancing each participant's regional network of peers. Accomplishing this involved a two-step process: 1) gathering State practices using a Program Information Tool (PI Tool) survey and 2) sharing high pay-off practices at regional peer exchanges that can improve construction performance.

Prior to each peer exchange, the practitioners were asked to respond to a survey – the Program Information Tool (PI Tool). This tool enabled each agency to select and prioritize agenda topics for the peer exchange based on the practices of highest interest to them (see Figure ES1). In essence, practitioners identified the agenda structure for the peer exchange they were participating in. Practitioners selected from topics within these overarching focus areas and their core elements:

1. Project Supervision and Staffing
   a. Determine Staffing Levels on Projects
   b. Establish Qualifications for Staff Consultants, and Contractors; and
   c. Establish Privatization Practices
2. Construction Safety
   a. Agency Safety Culture
   b. Worker Safety
   c. Public Safety
3. Construction Administration
   a. Project Documentation Record Keeping

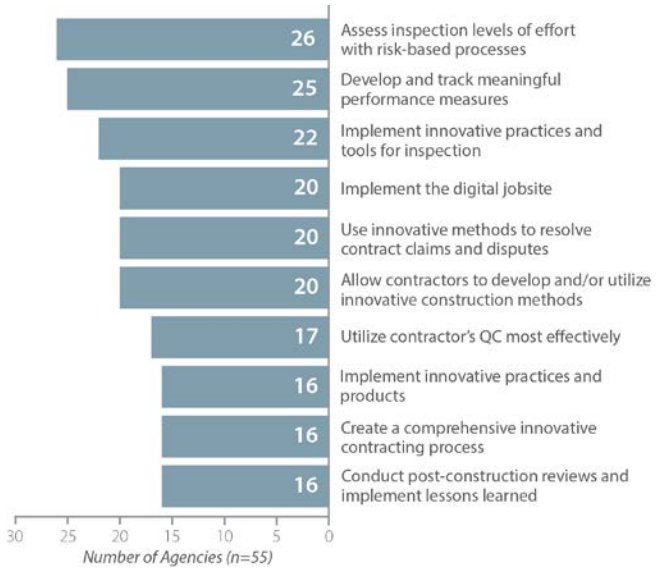

Figure ES1. Most Selected Peer Exchange Topics Nationally

   b. Project Conflicts and Claims
   c. Management of Contract Terms and Changes
   d. Management of Environmental Requirements
4. Construction Quality
   a. Performance Measures and Metrics
   b. Quality Assurance
   c. Inspection and Workmanship
5. Innovation
   a. Alternative Contracting
   b. Innovative Practices, Processes, Products and Equipment
   c. Recognition (of good work performed)
6. Communications/Data/Information Sharing
   a. Public Relations
   b. The NEPA Process, and Internal and External Feedback between Construction Staff and Others

Participation in the CPN was exceptional, as all 55 organizations completed PI Tool responses and submitted them for analysis. This provided an unprecedented set of data for the highway construction industry to build upon and led to this report to support the way forward. Additionally, nearly every State across the country participated in the regional peer exchanges, demonstrating the benefits of sharing proven practices and avoiding "re-inventing the wheel."

With the primary focus being on implementation after each peer exchange, agencies also shared web links, documents, and specifications with their peers for practices that have been successful. Each section contains a list of those documents that are available on websites and links to them. Agencies can continue to use this findings report to foster implementation.

Primary CPN Findings and Conclusions

Practitioners identified several needs with both owner agencies and industry partners. They also discussed areas of focus for the future. A few areas with high potential to advance construction practices are listed below.

- **Innovative Inspection and Using Risk-based Inspection Methods** (under the Construction Quality focus area) was a topic for the agenda at two peer exchanges and was the most requested discussion topic. This is a trend that matches well with tracking performance based on the elements of a project that have the highest potential for impact to cost, schedule, and safety.
- **Developing and Tracking Meaningful Performance Measures** (under the Construction Quality focus area) was ranked as the highest priority nationally, was discussed at four peer exchanges, and was the second most selected peer exchange topic. This topic is timely with the implementation of the Moving Ahead for Progress in the 21st Century (MAP-21)

legislation, which provides additional guidance and requirements for performance measurement.

- **Implementing the Digital Jobsite** (under the Construction Administration focus area) was the third most requested peer exchange topic. The relevance of this topic among agencies points to an opportunity for greater integration between design and construction teams. Efficiencies are possible with digital inspection applications, quality assurance using advanced technologies, going "paperless" and automation of processes, and software tools for project management, including electronic bidding tools and digital signatures. Agencies asked the question, "Is it possible to be 100% digital, and can that be achieved while satisfying auditing and oversight requirements?"

Practices that agencies noted they do well with and place a high priority on:

- **Administering Progress Payments and Final Payments** – most agencies have well-established practices in this area.
- **Quality Assurance (QA) and Quality Control (QC)** – agencies may use the contractor's QC data for acceptance on projects, and risk-based inspection can help optimize QA processes for items with potential to affect key performance measures. Agencies are interested in innovative ways to use contractor QC data in acceptance procedures.

There is a national trend towards improving the project development and delivery practices that have the greatest impact on key program and project performance measures, such as safety, project schedule and duration, quality, and cost. Highway construction programs can optimize the use of resources to expand and maintain our Nation's infrastructure by focusing on practices such as:

- **Prioritized inspection** activities (also called risk-based inspection);
- **Safer project designs for workers and motorists** through treatments such as positive barrier protection;
- **Enhanced communication** across disciplines, such as using multi-disciplinary teams for project assessment, inspection, and after-action reviews;
- **Carrying out environmental commitments** as originally intended from analysis results in the early project stages; and
- **Promoting greater construction efficiency** without sacrificing quality.

The Way Forward - Suggestions for Action

MAP-21 has additional focus on performance measurement at the system level. Agencies should evaluate the performance of their construction program both quantitatively (e.g. on-time and on-budget) and qualitatively (e.g. lessons learned/customer satisfaction). This can include sharing performance measures with the general public.

Risk-based inspection is another topic that could potentially optimize the balance in project performance measures such as quality, cost, and schedule. Using risk-based inspection, construction

activities may be prioritized based on the impacts associated with reduced inspection of certain lower-risk items. Agencies should be educated and encouraged to develop a risk-based prioritization scheme and focus available inspection resources on those activities where significant negative impacts could result if inspections are reduced. Materials testing has benefited from risk-based, statistical sampling, and this might also be applied beneficially to inspection for workmanship.

State transportation leaders can continue participation in a peer network maintained through the American Association of State Highway and Transportation Officials (AASHTO) to strengthen the power and cost effectiveness of sharing proven, effective practices. Using this venue, a follow up scan can be conducted to consider the highest payback practices in greater depth and potential topics for further research can be identified. Additionally, follow-up with States on what they implemented as a result of the CPN would also benefit future workshop programs, and the CPN PI Tool could be used annually as a self-evaluation for States.

How to Use this Document

The first step in using this document is to review the key topics of interest and the associated findings within each topic area in "Section 3. Analysis of the State-of-the-Practice in Highway Construction." You can then determine which practices are of greatest interest for your agency based on the focus areas. It may be helpful to share and discuss this document with your colleagues as means of reaching consensus on the highest priorities at your agency or organization.

"Section 3. Analysis of the State-of-the-Practice in Highway Construction," contains examples of notable practices in each focus area from the five regional peer exchanges, the gaps and needs that practitioners identified during those exchanges, and a list of actionable takeaways that State DOTs can use to refine their construction programs. This is followed by "Section 4. Suggestions for Implementation," which contains some of the best practices that were captured during the peer exchanges.

You will also find it helpful to review the specifications, training materials, and guidelines that have been included as web links at the end of each section; these are practices that your colleagues in other State DOTs have identified, discussed, and shared and which you may find useful as well.

Contact your FHWA Division Office, the FHWA Resource Center, or FHWA Headquarters for additional technical assistance and implementation support. One goal of the CPN is to foster additional dialogue on topics related to improving construction practices – it may also be possible to contact other State DOTs directly to discuss additional information on their practices. This will allow the spirit of the CPN to continue into the future.

Where to Find More Information

The Regional Peer Exchange Summary Reports, a marketing flyer, and the PI Tool are available at the FHWA Construction Peer Network Website: https://www.fhwa.dot.gov/construction/cpn/

For more information, contact:
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1. Background on the CPN

In partnership with the American Association of State Highway and Transportation Officials (AASHTO), the Associated General Contractors of America (AGC) and the American Road & Transportation Builders Association (ARTBA), the Federal Highway Administration (FHWA) initiated the Construction Peer Network (CPN) in the fall of 2011. The goal of the CPN project was to support the widespread deployment of proven and exemplary construction practices through peer exchanges among field practitioners.

The CPN used a structured approach to identify, capture, and share today's most effective highway construction practices with the objective of improving quality, reducing costs, and optimizing project duration to reduce impacts. It was also intended to benefit State DOTs and the contracting community by providing State DOTs with options for maximizing limited resources and developing or enhancing each participant's regional network of peers. Accomplishing this involved a two-step process: 1) gathering State practices using a Program Information Tool (PI Tool) survey and 2) sharing high pay-off practices at regional peer exchanges that can improve construction performance.

A steering team of State DOT officials, contractors (AGC and ARTBA), and the FHWA guided the development of the CPN. The PI Tool was developed to assist States with collection of information on practices in six focus areas that make up a typical construction delivery program as well as a set of core elements for each. Examples of the core elements within each focus area are:

1. Project Supervision and Staffing
   a. Determine Staffing Levels on Projects
   b. Establish Qualifications for Staff Consultants, and Contractors; and
   c. Establish Privatization Practices
2. Construction Safety
   a. Agency Safety Culture
   b. Worker Safety
   c. Public Safety
3. Construction Administration
   a. Project Documentation Record Keeping
   b. Project Conflicts and Claims
   c. Management of Contract Terms and Changes
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4. Construction Quality
   a. Performance Measures and Metrics
   b. Quality Assurance
   c. Inspection and Workmanship

5. Innovation
   a. Alternative Contracting
   b. Innovative Practices, Processes, Products and Equipment
   c. Recognition
6. Communications/Data/Information Sharing
   a. Public Relations,
   b. The NEPA Process, and Internal and External Feedback between Construction Staff and Others

The PI Tool, constructed as a series of questions presented in a matrix format, focused on practices likely to have the greatest impact on a transportation agency's construction delivery process. The CPN User Guide and PI Tool describes the process for collecting the State construction information and is presented at the end of this report in Appendix A.

The information gathered from the PI Tool led directly to the planning and execution of the regional peer exchanges. Exchange topics for each peer exchange agenda were determined from the State DOT responses to the PI Tool. Topics were determined based on State topic rankings and trends in the PI Tool results for each region. Lead State presentations on successful construction practices, followed by facilitated roundtable discussions, were the focus of each peer exchange.

Using a regional approach, peer exchanges were conducted at approximately 4-month intervals. Figure 1 below shows the grouping of States for the five peer exchanges, the host location, and date of each event.

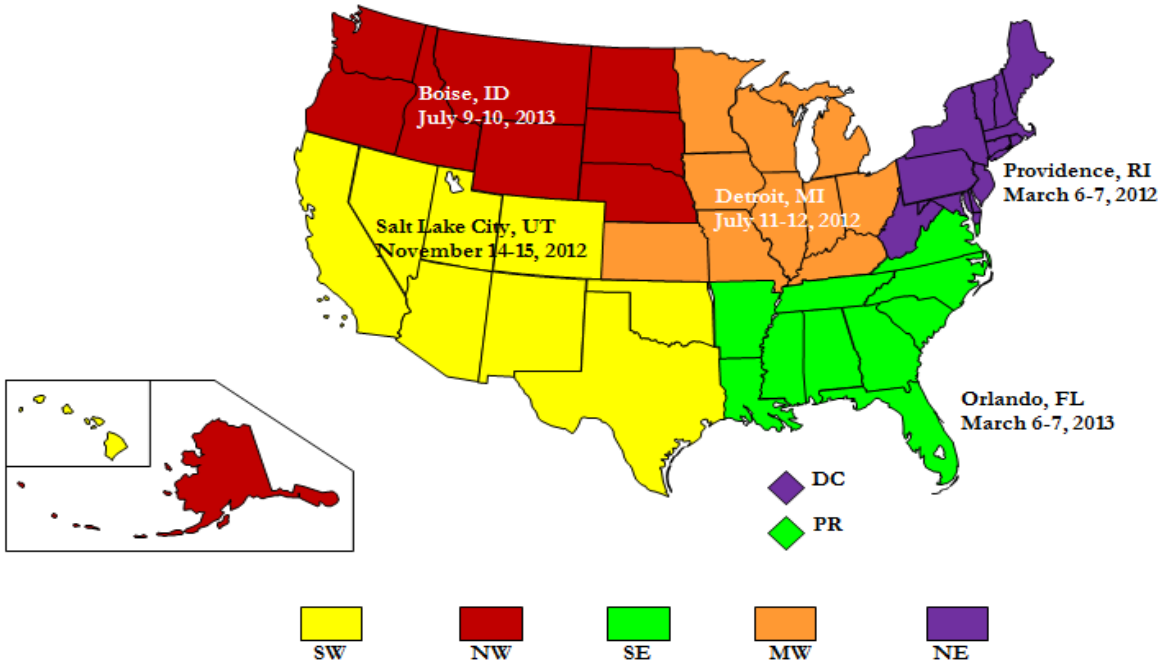


Figure 1. CPN Regional Peer Exchange Groups and Locations

Participants in the regional peer exchanges included personnel from:

- 48 State DOTs
- District of Columbia
- Commonwealth of Puerto Rico
- 3 FHWA Federal Lands Highway Offices
- 50 FHWA Federal Aid Division Offices
- FHWA Headquarters, Turner Fairbank Highway Research Center, and the FHWA Resource Center
- AGC, ARTBA, and AASHTO.

All States responded to the survey, and the results shaped each region's peer exchange. A summary report is available for each regional event on FHWA's website https://www.fhwa.dot.gov/construction/cpn/.

2. Key Focus Areas from the Regional Peer Exchanges

All 55 transportation agencies that were invited to participate completed the PI Tool. A clear finding from the 55 survey responses is that the peer exchange topics selected at the regional level generally matched the most highly rated topics at the national level. The PI Tool also asked agencies to rate topics on various scales based on how much of a priority the practice is, how often the practice is used, and how well the agency uses it. While a topic or practice may be a priority, agencies may not have selected it as a peer exchange topic for discussion if they ranked their use of it highly. They focused on peer exchange topics that are a priority for the agency but are only beginning to be considered or implemented.

National rankings were calculated based on a simple ranking of each topic by the number of PI Tool users who selected that topic for a peer exchange. Regional rankings were calculated based on results from PI Tool users within each region only. Additionally, at the first peer exchange, practitioners cited interest in having a session entitled "Other Regional Priorities" – which became a portion of each peer exchange agenda that allowed agencies to bring up additional topics for discussion that were particularly important but that did not necessarily fall under the list of possible peer exchange topics provided in the PI tool.

Figure 2. Most Selected Peer Exchange Topics Nationally

The most selected peer exchange topics (see Figure 2) among the 55 respondents are ranked in order of top ten selected. The number of peer exchanges that included a discussion on that topic is also noted.

- **Assess inspection levels of effort with risk-based processes** (under the Construction Quality focus area). This was a topic at two peer exchanges, where practitioners addressed formal inspection checklists and processes for what to inspect and how often based on the potential impact to quality, schedule, and cost.
- **Developing and tracking meaningful performance measures** (under the Construction Quality focus area) was ranked as the highest priority topic nationally, was discussed at four peer exchanges, and was the second most selected peer exchange topic. Practitioners examined the value of time-, budget-, and quality-based metrics.

- **Implement innovative practices and tools for inspection** (under the Innovation focus area) was a topic selected for discussion at three peer exchanges. Practitioners addressed "roving" bridge deck teams, thermal imaging, and ground penetrating radar.
- **Implement the digital jobsite** (under the Construction Administration focus area) was a topic of discussion at three peer exchanges. These conversations centered on record-keeping, surveying, inspection documentation, electronic signatures, plan sets, and electronic bidding processes.
- **Using innovative methods to resolve contract claims and disputes** (under the Construction Administration focus area) was discussed at three peer exchanges. Practitioners talked about the use of dispute review boards and partnering processes.
- **Allowing contractors to develop and/or utilize innovative construction methods** (under the Innovation focus area) was selected as a topic at three peer exchanges. Practitioners considered how the DOT as project owner could provide flexibility in the contract to allow for innovation and more efficient construction methods.
- **Utilize contractor's QC most effectively** (under the Construction Quality focus area) was a topic at one peer exchange. The conversation centered around DOT acceptance decisions that include use of contractor quality control data.
- **Implement innovative practices and products** [for worker safety] (under the Construction Safety focus area) was selected for discussion at one peer exchange. Here, practitioners talked about positive protection, intrusion alarms, automated enforcement, and use of law enforcement officers to provide a "presence" function on projects.
- **Create a comprehensive innovative contracting process** (not a formal agenda topic but a topic of discussion generally). Practitioners explored design-build, cost plus time, fixed price variable design, construction manager/general contractor (CM/GC), and job order contracting topics.
- **Conduct post-construction reviews** and implement lessons learned (under the Communication focus area was a topic discussed at one peer exchange. Practitioners deliberated on documenting lessons learned for implementation on future projects.

Practitioners selected two formal agenda topics for discussion that did not make the top 10 nationally in priority or in highest ranked peer exchange topic. These topics showed regional interest but overall were ranked lower nationally. Regional peer exchange topics selected that did not pair with the top 10 most highly rated peer exchange topics (see Figure 3) at the national level include:

- Project Staffing (3 peer exchanges) – Determining staffing levels by project, annually, or over a 3-to-5 year horizon. Agencies generally plan for staffing needs for the current construction season, while an enhancement to this practice is planning and adjusting staffing needs for a longer term horizon, such as 3 to 5 years. A common topic for discussion is cross-training maintenance and construction personnel for both duties.

Figure 3. Highest Priority Topics Nationally

- Establish Qualifications for Contractors (1 peer exchange) – DOT processes for contractor pre-qualification prior to bidding. Some agencies use past performance while others use contractor financial reviews to ensure contractors have the capacity to perform. Formal processes can be used that weight various factors to establish an overall contractor rating. This process helps owner-agencies minimize potential issues in the future and is also beneficial for contractors by providing an incentive to focus on quality and workmanship.

3. Analysis of the State-of-the-Practice in Highway Construction

This section provides information on noteworthy construction program practices that have been identified under each of the six CPN focus areas, identifies gaps and needs, and provides potential takeaways that will help State DOT's advance their construction program practices. Facilitators asked participants at each peer exchange to identify the key items that have been discussed that could be implemented in their State, which ultimately became the key takeaways – or ideas that States planned to use in practice. This led to sharing practice information via documents and web links to help spur implementation of ideas on a more widespread basis nationally. More information on these practices can be found in the regional peer exchange summary reports, available at https://www.fhwa.dot.gov/construction/cpn/. Links to information, resources, and contacts are also provided at the end of each section, and agencies can use these links to help develop processes, specifications, or other documentation for including the practice in their own program.

The "Actionable Takeways" section for each topic area contains ideas for States to explore further on their own. Additionally, a domestic scan or future research on specific topic areas would also be beneficial to document additional practice examples and help States with implementation and technology transfer across agencies.

3.1 Project Supervision and Staffing

In the Project Supervision and Staffing focus area, practitioners selected from among the following core elements to identify agenda topics for the regional peer exchanges:

- Determine Staffing Levels on a Project
- Establish Qualifications for Staff, Consultants, and Contractors
- Establish Privatization Practices

Project Supervision and Staffing: Half of participating agencies rated themselves highest for establishing construction technician qualifications.

The most routinely used practice (64% of agencies) is determining staffing levels for the current construction season.

While practitioners did select Determine Staffing Levels on a Project and Establish Qualifications for Staff, Consultants, and Contractors as agenda topics, Establish Privatization Practices was not selected as an agenda topic at any of the five regional peer exchanges.

3.1.1 Noteworthy Practices

Some agencies cited use of staffing analysis programs to help them determine staffing levels on projects. These applications range from relatively simple spreadsheets to a department-wide work-

load analysis involving project-level staff and regional business managers, then rolling up to region-wide reports and even cross-region resources balancing. Some of these staffing programs were linked directly to hiring plans and consultant utilization. Agencies had some variance in their consultant utilization approach. Some agencies reported having target levels while others directed the "overflow" funding for consultants.

Determine Staffing Levels on a Project

With regard to projecting staffing needs, the Texas DOT has developed a computer program to verify the core number of construction employees needed to monitor its work. The program delivers a "snapshot in time" view of the number of employees needed. One of the assumptions used is the contract dollar value of work an individual inspector could handle. The system notes peaks and valleys of employee availability in various districts and factors in annual leave, sick leave, overtime, and required time off.

This model has been used to convince the legislature that the DOT needs a given number of employees and cannot absorb further staff cuts. In practice, the system allows neighboring districts to share resources and to better optimize use of supplemental consultant help. In many cases, the travel time between Texas districts is about an hour, allowing personnel to be shared temporarily.

The Utah DOT and some other DOTs are involving their maintenance forces in construction inspection activities and vice versa. The peak workloads for each function occur at different times of the year — construction in summer months, maintenance during the winter. Combining the two workforces can help with resource leveling without increasing staff. Gaining acceptance from both workgroups can be challenging, but there are benefits to both functions in terms of career path advancement as well as pay and job satisfaction. Several DOTs attending the southwest peer exchange thought this would be a positive approach and will consider pursuing implementation.

Combining construction and maintenance workforces brings about a need for additional training. The cross-training required when combining work forces within an agency can be overwhelming. Agencies often consider only training maintenance personnel to perform minor construction tasks or repair jobs and to do less technical work. However, to fully develop employees who will be an asset to the DOT in the long run, DOTs should train maintenance employees to oversee significant construction operations. Likewise, construction personnel must be trained in the performance of maintenance activities and given opportunities to operate maintenance equipment prior to the actual need for maintenance items such as snow removal work.

Establish Qualifications for Staff, Consultants, and Contractors

Most DOTs perform some type of contractor prequalification. States that do not have formal prequalification depend on the bonding company to help approve contractors. Every DOT that performs prequalification has different rules and requirements. DOTs believe the benefit of prequalification lies in getting the contractor's attention if there are problems with the quality of

their work. Contractors believe prequalification may keep them from having to bid against "fly-by-night" contractors and helps level the playing field. Those DOTs using prequalification were very interested in how others rated the quality of a contractor's work as an element of their prequalification rating.

States have different formulas to rate their contractors. They use some combination of financial resources, equipment, personnel experience, and past performance to develop a weighting factor that produces a dollar amount of work the contractor can have under contract at any time. The contractor's prequalification amounts may be grouped into dollar amount ranges, such as up to $2 million, between $2 and $20 million, between $20 and $50 million, or an unlimited dollar amount. The contractors present at one peer exchange noted that they want the process to be objective, and having a level playing field is important but should not necessarily be the primary focus. DOTs thought that implementing example practices for contractor quality rating techniques could add considerable value.

Tables 1-3 at the end of this section contain links to resources such as Florida's Prequalification and Contractor Rating Systems and Utah's Contractor Rating Flowchart and Guidelines.

3.1.2 Gaps and Needs

Agencies cited interest in securing and using on-call consultant contracts for short notice or emergency needs and wanted to learn more about processes and procedures that work well. Several agencies expressed interest in learning how to save on resources for what would be considered low-risk projects. They also hoped to learn more about inspection methodologies and techniques based on projects with different risk elements. Another topic mentioned by several agencies highlights interest nationally in documenting models and tools for cross-training construction and maintenance staff for optimized workloads during the summer and winter.

3.1.3 Actionable Takeaways for State DOTs

- There was specific interest in training technician-series staff; however, results were mixed on the use of technician certification programs. Practitioners noted that guidance would be useful in determining what to require, what types of certification acceptance programs are beneficial, and suggestions for how stringent to make the requirements. This could come in the form of a national synthesis of practice review of State DOT programs for technician certification.
- Evaluating staffing needs on a longer term horizon than just the current construction season may be a best practice where additional technology transfer can provide benefits to agencies, such as through the Florida DOT assessment tool included in the links table. Additionally, Texas DOT developed an electronic tool to verify the core number of construction employees needed to monitor their program, which could be a beneficial practice in other States.

The following table includes links to further information on agency practices.

Table 1. Notable Agency Practices in the Project Supervision and Staffing Focus Area – Contractor Qualifications

Contractor Qualifications	
Establishing Qualifications for Contractors	
Caltrans Project Closeout Survey Documentation	http://www.dot.ca.gov/phpesp/public/survey.php?name=Project_survey_copy_copy_copy1_copy_copy_copy_copy_copy1
Florida DOT Contractor Rating System	http://www.dot.state.fl.us/construction/Manuals/cpam/New%20Clean%20Chapters/Chapter13s1.pdf
Florida DOT Contractor Rating System for FDOT	http://www.dot.state.fl.us/construction/Manuals/cpam/New%20Clean%20Chapters/Chapter13s3.pdf
Florida DOT Prequalification Information	http://www.dot.state.fl.us/procurement/pubs/Rule%2014-75new.pdf
Florida DOT Prequalification Information	http://www.dot.state.fl.us/procurement/prequalification.shtm

Table 2. Notable Agency Practices in the Project Supervision and Staffing Focus Area – Oversight with Diminishing Resources

Oversight With Diminishing Resources	
Establishing Qualifications for Contractors	
RFP for NCHRP 10-89: Guidebook for Optimal Construction Inspection (currently under contract)	http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=3168

Table 3. Notable Agency Practices in the Project Supervision and Staffing Focus Area – Project Staffing

Project Staffing	
Determining Staffing Levels on a Project	
Florida Staffing Needs Assessment Tool	http://www.dot.state.fl.us/Construction/DesignBuild/ConsultantCEI/ConsultantMain.shtm

Project Staffing (cont'd)	
Establishing Project Staffing Qualifications – Adequate Experience, Training	
Idaho Engineer-in-Training Manual – Mentoring Program	http://itd.idaho.gov/eit/pdf/EIT_MANUAL.pdf
Other Regional Priorities	
Utah DOT Transportation Technician Review Policy	http://www.udot.utah.gov/main/uconowner.gf?n=15066102447485416

3.2 Construction Safety

In the Construction Safety focus area, practitioners selected from a variety of topics for the regional peer exchanges, while three primary topics surfaced at each, including:

- Agency Safety Culture
- Worker Safety
- Public Safety

While Safety Culture was selected as a topic at the southeast peer exchange, Worker and Work Zone Safety were discussed as an element of "other regional priorities" at the northwest and southwest peer exchanges.

Practitioners should note that the National Work Zone Safety Information Clearinghouse website is a resource for agencies to use in finding guidelines, online training, and also access to instructor-led training opportunities construction workers, law enforcement, emergency service personnel, technicians, supervisors, inspectors, and engineers. It can be accessed at http://www.workzonesafety.org.

Construction Safety: Nearly two-thirds of agencies rated themselves highest in creating safety policies.

While not selected as a formal agenda topic for the peer exchanges, participants initiated discussion on work zone safety and worker safety at all five peer exchanges.

3.2.1 Noteworthy Practices

Under the focus area of construction safety, several agencies noted that it helpful to undertake Occupational Safety & Health Administration (OSHA) project reviews in a partnership role. Training is also a key element, and agencies noted that training requirements, such as a requirement to have a certified work zone supervisor on the contractor staff on each project, are important elements for maintaining a safe work zone.

Notably, a Strategic Highway Research Program 2 (SHRP 2) Project on occupational fatigue has also been completed. The project focused on "Identifying and Reducing Worker, Inspector, and

Manager Fatigue in Rapid Renewal Environments," and produced a toolbox that included guidance documents and presentations on how to identify and curb worker fatigue in construction work zones. As a supplement to this SHRP II project, Texas DOT has taken the lead on a 3-year project to perform training and outreach on worker fatigue and situational awareness for work zones. Products will include display materials, handouts, and message items for conferences, along with two 30-minute web-based training courses.

Agency Safety Culture

Contractors have been particularly successful in implementing mentoring programs, which can help to institute a safety culture among practitioners. These programs include a formal agreement between mentors and protégés to pass along experiences and lessons learned. This can be especially important in worker safety as a practical supplement to formal training. Formal mentoring programs can help field staff make better and faster decisions and provide for succession planning.

See Table rat the end of this section for a link to the Granite Construction mentoring program presentation and handbook.

With regard to training, ARTBA has worked together with FHWA and other partners to provide a set of safety training courses, collectively called the Roadway Safety+ Program, covering many of the situations encountered on highway construction and maintenance projects. The program also has self-guided, computer-based training modules and materials that can be downloaded for free and used for project/company/DOT safety training. The materials can be used by agencies or contractors either as a full training course or for specific areas of safety concern at weekly safety meetings. The American Traffic Safety Services Association also offers instructor-led and web-based training for worker safety, work zone safety, and design applications for temporary traffic control.

See Table 4 at the end of this section for links to the ARTBA Roadway Safety+ Program and the National Work Zone Safety Information Clearinghouse.

Worker Safety

Several States have undertaken various efforts to improve worker safety. For example, Idaho commissioned a research project to develop guidelines for positive protection decision-making. In design-build projects, Idaho also evaluates safety performance and contractor ratings. Safety ratings may be reviewed in the request for qualification stage of a project to determine contractor safety performance on previous projects.

In Washington State, one contractor's safety plan for a previous project was so exceptional that the DOT adopted it on a statewide basis.

Most peer exchange attendees agreed that construction safety training is needed, particularly modules for personal protection and staff safety (in addition to OSHA training). Understanding

DOT responsibility is another challenge in that contractors are required to meet OSHA standards and requirements.

One practice mentioned from a past project in Florida involved the use of a portable changeable message sign to display the dollar value of citations issued in or around the project (updated annually). For longer term projects this may be beneficial for reducing speeds.

In one state, a contractor designated approved cell phone use areas on the project site and developed a policy for separation of pedestrians and work vehicles. In addition, Performance Class III high visibility apparel has been adopted by many contractors for use all the time on projects. In one case, a participant cited use of daily kick-off meetings that a contractor held on project sites where the DOT was invited to discuss planned activities for the day.

At the southwest region CPN peer exchange, recent fatalities involving employees of the California Department of Transportation (Caltrans) were background for this topic. The roundtable discussion of regional priorities included discussions about both DOT and contractor accidents as well as accidents caused by motorists entering the work zone. Much of the conversation centered on the changes being implemented by DOTs—many of which could be adopted by others. Some examples include an Arizona policy that allows blue and red lights on the rear of vehicles and a Colorado practice to track accidents involving workers or drivers on cell phones. Colorado also allows reflective tape to be added on the rear of vehicles and has worked with the highway patrol to increase the level of drunk-driver checks. In Florida, work zone speeds are displayed on a message board, and traffic control deficiencies are added to items assessed during the prequalification stage. In Utah, the DOT, industry, and highway patrol formed a joint committee to discuss ways to improve work zone safety.

3.2.2 Gaps and Needs

A broad range of challenges exist for construction safety both on the work zone safety elements and occupational safety elements. These challenges include:

- Preventing runover/backover injuries and fatalities;
- Proper adherence to OSHA requirements for shoring for trenches, worker safety apparel, and fall protection when working adjacent to bridge rails; and
- Worker exposure to traffic and the need for (and when to use) positive protection.

3.2.3 Actionable Takeaways for State DOTs

- Agencies struggle with how far to go with formal requirements and specific qualifications for flaggers, inspectors, and construction workers. Agencies can review the table of links and contact other States for additional details on their certification programs. There are online flagger training courses available from multiple sources, and agencies should consider whether or not they will require additional certifications and what those programs could look like.

- Agencies generally expressed interest in learning more about work zone safety-related items, including guidelines for use of positive protection barriers, the use of local police officers to provide a law enforcement presence (paid by the agency or as overtime off-duty officers paid through the construction contract), establishment and use of work zone performance measures, use of employee incentives to improve safety, and also off-site production or pre-fabricated elements to minimize worker exposure. Table 4 below includes a link to the ARTBA Roadway Safety+ Program and other guidelines and training available through the Work Zone Safety Information Clearinghouse.

The following table includes links to further information on agency practices.

Table 4. Notable Agency Practices in the Construction Safety Focus Area – Work Zone Safety

Work Zone Safety	
Implementing Innovative Products for Worker Safety	
ARTBA Roadway Safety+	http://www.workzonesafety.org/training/courses_programs/rsa_program
National Work Zone Safety Information Clearinghouse	http://www.workzonesafety.org
Other Regional Priorities Discussion	
Florida DOT Design Standard for Motorist Awareness	http://www.dot.state.fl.us/rddesign/DS/13/IDx/00670.pdf

3.3 Construction Administration

In the Construction Administration focus area, practitioners selected from among the following core elements to identify agenda topics for the regional peer exchanges:

- Project Documentation Record Keeping
- Project Conflicts and Claims
- Management of Contract Terms and Changes
- Management of Environmental Requirements

Project Documentation and Record Keeping was a formal agenda item for four out of the five regional peer exchanges, followed closely by Project Conflicts and Claims, which was a topic at three regional peer exchanges. Management of Contract Terms and Changes and Management of Environmental Requirements were not selected as agenda topics; however, agencies often initiated discussion on enhancements to change order processes and how to successfully avoid or resolve disputes.

3.3.1 Noteworthy Practices

Project Documentation Record Keeping

The main subtopic of interest for this focus area was implementing the digital job site. DOTs have selected from available software systems that best fit their existing business practices, such as AASHTO's Site Manager, and mixed these together along with their own systems to meet overall needs. DOTs are working on how to further develop and integrate the different digital systems to optimize operations and project delivery, such as data entry/access, documentation, approvals, and payment. No DOT offered its system as being mature; rather, they are works in progress. Some common practices that have been successful to date include:

Construction Administration: The most routinely used practice for all of the CPN questions was administering progress payments and final payments (93% of agencies rated "routinely").

The highest priority topics are environmental commitments (45%), formal change order processes (40%), and LPA project oversight (38%).

- Current or planned use of ProjectWise and SharePoint for documentation, approvals and real-time, web-based communications (Utah DOT, Nevada DOT, Colorado DOT).
- Providing the digital terrain model (DTM) to contractors for use in automated machine guidance. States provide the DTM along with a disclaimer to avoid liability for errors. Some states plan to provide the DTM ahead of the bid to better inform contractors (Nevada DOT, Arizona DOT, Caltrans, and Utah DOT).

In the southwest, it was emphasized that little would get done without having someone in the agency become the champion for the individual digital system being develop. This is true for many changes, but especially in the today's evolving digital age. Without a champion, many changes are discussed but do not come to fruition. It was also noted that systems often fail because of complexities with maintaining digital systems. Specifically, many involved with digital systems want to develop or build them, but do not want to continually maintain them.

Michigan DOT is the national leader in implementing an electronic project document management system (e-Construction) at a program level, but the DOT recognizes it is still working toward full implementation; for example, there is a need to have an electronic "file cabinet" for construction documents. Michigan DOT is exploring a comparison of Document Express and Project Wise for use as the electronic "file cabinet." The agency noted that when electronic signatures can be used for items like change orders, there are a lot of advantages. Benefits include the fact that business processes are accelerated dramatically, there is less paperwork, and contractor payments are accelerated.

Along with State DOTs, contractors are moving into the digital age in the way they perform office and field work. Construction equipment controlled electronically is becoming more common place. The equipment now uses electronic digital data that could be furnished by the DOT. For example, earthwork performed by equipment using electronic machine control generates data in the onboard computer which is used to calculate earthwork volumes for work completed. The DOT, in turn, could use this information to determine accurate intermediate and final pay quantities. The general thought of the peer exchange participants was for both the DOT and contractor to share electronic data. FHWA's Central Federal Lands Office has considerable experience with electronically controlled machines, including specifications for their use.

See Table 5 for a link to the Caltrans Draft Guidelines for Implementing Automated Machine Guidance. In addition, three-dimensional engineered models for construction (3D models) are among a few select technologies being promoted by the FHWA Every Day Counts (EDC) program. FHWA's focus is on helping owner-agencies, designers, and construction contractors with little or no experience in 3D engineered models get started in implementing this technology. More information is available at http://www.fhwa.dot.gov/construction/3d/.

Project Conflicts and Claims

A claim settlement can become a long and costly process for both owners and contractors. Often, claims result from one or both parties delaying the resolution of a problem or making a decision. A "team" approach to anticipating potential issues early on can help alleviate problems that may ultimately lead to a claim.

A number of States use Dispute Resolution Boards (DRB) when a claim cannot be settled at the project or district level. Agencies can set up DRBs (especially on larger projects) where the team members visit the project at various times – gathering information, making recommendations, and staying current on project activities. On smaller projects the DRB can be "on call" for when claims arise. Costs for this activity are generally shared by the contractor and the DOT. Because disputes can be expensive, DRBs are typically used more often on larger, higher dollar value projects. Regardless of project size, DRBs have been beneficial in settling many claims without the need for litigation. Members of the DRB are often former contractors, city engineers, DOT personnel, and attorneys.

The Ohio DOT has emphasized reducing claims and expediting their resolution. Their approach is to practice partnering. In Ohio, partnering has become the culture, not just a strategy.

Another successful practice is to review the successes and lessons learned from a project to allow for continual improvement. The Ohio DOT has a review team analyze change orders and frequency of Value Engineering Change Proposals (VECP) that are submitted. Trends are identified and adjustments made in the appropriate business processes. The Kentucky Transportation Cabinet also documents lessons learned from post–construction reviews.

See Table 5 at the end of this section for links to such resources as Florida DOT's DRB Special Provisions; links to the dispute resolution program information pages at the Alaska, Oregon, and Idaho DOTs; and the NHI "Change Orders, Claims, and Dispute Resolutions" course (Course Number: FHWA-NHI-134110).

3.3.2 Gaps and Needs

Several agencies expressed interest in learning more about practices that can support oversight of local public agency projects to ensure that State and Federal requirements are met. Additionally, agencies discussed and shared information on:

- How to encourage more contractor-initiated value engineering proposals that can provide for cost savings and greater project efficiencies;
- Best practices for how to reduce lawsuits related to planning and permitting processes;
- How agencies handle claims from subcontractors on projects;
- How to quantify overhead values for delay claims;
- Incorporation of electronic signatures into payment and change order processes;
- FHWA research on assessing how highway agencies are transitioning to a more paperless project delivery system (e-Construction) and documenting the cost, benefits, and challenges of doing so;
- Claims processes and final payment including retainage practices; and
- FHWA research resulting in the report, *Analysis of Construction QA Procedures on Locally Administered Federal-aid Projects,* due to be published during the summer of 2014.

3.3.3 Actionable Takeaways for State DOTs

- National Cooperative Highway Research Program (NCHRP) Project 10-89 *Best Practices Guidebook for Optimal Construction Inspection* was a direct result of practitioner action based on discussions at one CPN Peer Exchange. Additional guidance on how to apply these concepts to construction inspection resource planning would also benefit DOTs.

The following table includes links to further information on agency practices.

Table 5. Notable Agency Practices in the Construction Administration Focus Area – Contract Claims and Disputes

Contract Claims and Disputes	
Resolving Contract Claims and Disputes	
NHI Claims Avoidance Course	http://www.nhi.fhwa.dot.gov/training/course_search.aspx?tab=0&key=claims+avoidance&res=1
Partnering Tips and Tricks	http://roadwaystandards.dot.wi.gov/standards/admin/index.htm

Contract Claims and Disputes (cont'd)	
Using Innovative Methods to Resolve Contract Claims and Disputes	
Alaska Special Provision for Design-Build – DRBs	http://www.dot.alaska.gov/comm/assets/DB/AppH_SpecialProvisions_rev1.pdf
FDOT Claims by Contractor Standard Specification	http://www.dot.state.fl.us/specificationsoffice/Implemented/SpecBooks/2013/Files/005-2013.pdf
FDOT DRB Special Provisions	http://www.dot.state.fl.us/specificationsoffice/Implemented/Workbooks/JanWorkbook2013/Files/SP0080308SDRB.pdf
FDOT DRB Special Provisions	http://www.dot.state.fl.us/specificationsoffice/Implemented/Workbooks/JanWorkbook2013/Files/SP0080307DRB.pdf
FDOT DRB Special Provisions	http://www.dot.state.fl.us/specificationsoffice/Implemented/Workbooks/JanWorkbook2013/Files/SP0080307RDRB.pdf
FDOT Partnering Program and Special Provision	http://www.dot.state.fl.us/construction/ContractorIssues/Partnering/Partnering.shtm
FDOT Partnering Program and Special Provision	http://www.dot.state.fl.us/specificationsoffice/Implemented/Workbooks/JanWorkbook2013/Files/SP0080306.pdf
FDOT Specification Development Procedure	http://www2.dot.state.fl.us/proceduraldocuments/procedures/bin/630010001.pdf
FDOT Specification Industry Review	http://www2.dot.state.fl.us/SpecificationsEstimates/Development/IndustryReview.aspx
FDOT State Arbitration Board	http://www.dot.state.fl.us/construction/arbitration/Arbitration.shtm
Idaho Dispute Review Board	http://apps.itd.idaho.gov/apps/DRBRoster/default.aspx
Idaho Warranty Seal Coat Evaluation Guide	http://www.itd.idaho.gov/design/contractors/Seal%20Coat%20Warranty.pdf
North Dakota Notice of Intent to File a Claim Form	https://www.dot.nd.gov/forms/sfn16743.pdf
Oregon Alternative Dispute Resolution Program	http://www.oregon.gov/ODOT/HWY/CONSTRUCTION/pages/adr_program.aspx
Oregon Alternative Dispute Resolution	http://www.oregon.gov/ODOT/HWY/CONSTRUCTION/pages/adr_program.aspx

Contract Claims and Disputes (cont'd)	
Oregon Standard Specifications – see Section 00199 - Disagreements, Protests and Claims	http://www.oregon.gov/ODOT/HWY/SPECS/docs/08book/08_00100.pdf
WSDOT/AGC Structures Constructability Review	http://www.wsdot.wa.gov/NR/rdonlyres/BB11517C-4FD8-47DC-B0BE-FDAAC9CB447E/0/DesignReviewChecklist.pdf

3.4 Construction Quality

In the Construction Quality focus area, practitioners selected from among the following core elements to identify agenda topics for the regional peer exchanges:

- Performance Measures and Metrics
- Quality Assurance
- Inspection and Workmanship

Inspection was a topic on the agenda for all five regional peer exchanges, followed by Performance Measures and Metrics, which was on the agenda for four out of the five exchanges, and Quality Assurance, which was selected for one peer exchange.

3.4.1 Noteworthy Practices

While performance measurement was rated as the highest priority, the most commonly cited need was guidance on risk-based inspection or inspection techniques to support risk management. There is a direct tie to performance in focusing inspection resources on the highest impact elements of construction.

Construction Quality: The highest priority practice nationally is developing and tracking meaningful performance measures (rated highest priority by more than half of the agencies).

Consequently, nearly 40% of agencies have not implemented a performance management process.

Performance Measures and Metrics

States with performance management processes commonly use construction performance measures and goals that relate to safety, project time, and project cost. One less common performance measure that might provide benefit is motorists and pedestrian access to businesses during construction, which was mentioned by a representative from Idaho.

In addition, various attendees at the peer exchanges offered insights based on their own State practices:

- New York and Rhode Island conduct formal evaluations to assess the cause for change orders to allow agencies to determine how well the project performed.
- While designers may be measured by how well they meet advertised dates, Connecticut has found that this can lead to a decrease in the quality of plans and specifications with use of this measure.
- Several States consider force account items such as the price adjustment clause or incentives and disincentives when determining if a project met the performance measures.
- Massachusetts, Maryland, Pennsylvania, and New York share performance measures transparently with the general public.
- Consultants are rated on their performance in relation to established measures in New Jersey and Pennsylvania.
- Tennessee uses system or program based measures versus project based. Some States have a few measures, while others use a higher number of measures for process improvement. It is important to share the information with key stakeholders after the analysis.

Florida DOT provides objective reports to contractors so that they can make any course corrections needed. As an agency, Florida DOT uses the ratings in the pre-qualification process equation for calculating bid capacity. Ratings can then affect bid capacity and contractors understand the process and this may promote immediate corrections in practice. This may impact capacity as well as selection for future design-build projects. Timely completion, environmental impacts, coordination, and communication are all measured. Verbal warnings and deficiency letters are used to notify contractors of issues. Bonus points are also given for exceeding requirements such as contract time.

Virginia DOT has a public dashboard with color coding similar to traffic signal colors to provide public information in a very simple way. Users can select a project to look at performance. Other States agreed that it is important to understand how the public perceives projects and to gather input from the public at the project level. Information obtained anonymously can also be useful.

MAP-21 performance measures are being developed and focus more on system-wide operation of assets, but States may also be looking at how these will affect construction.

Quality Assurance

There is a growing need to use construction inspection resources optimally. In Massachusetts the quality assurance process is adjusted depending on the type of asphalt paving project, for example. A one-size fits all approach is not used due to varying needs for inspection resources based on project type. An NCHRP project to review this topic and provide recommendations is under way.

At the northwest region peer exchange, one participant noted that DOTs have historically required source documentation for all items such as material or soil quantities. DOT inspectors typically take

load tickets as materials are placed to provide for source documentation for the quantity of material used on a project. DOTs may want to consider allowing the contractor to collect tickets and provide summaries certifying the quantities to increase efficiency. A quality control/quality assurance plan with daily work reports is necessary to implement this practice, so that the DOT can provide adequate oversight. The contractor would also need to follow the construction manual requirements for inspection that would otherwise be performed by DOT personnel. The use of new equipment and methods to verify results could help with implementing this practice.

Table 6 at the end of this section provides a link to an example of South Dakota's standard notes and requirements for contractor material checking and weight ticketing.

Inspection and Workmanship

States such as Idaho, Louisiana, and North Carolina use field data collection technologies such as mobile tablets, video, "Light Detection And Ranging" (LiDAR), and maturity meters. Tablets are being used to electronically document field inspections with the data linked to SiteManager software as part of the digital jobsite. Other examples of innovative technology applications include:

- GPS rovers for field measurement to check quantities and grades;
- Video cameras on equipment for inspection and data collection;
- LiDAR for data to supplement surveys (initial and final cross sections) and to develop as-builts;
- Automated machine guidance for construction projects;
- Laser scanning used to measure items such as earthwork quantities and damage on a bridge girder from an oversize vehicle. See Table 6 for a research report sponsored by the Illinois DOT that explores the effectiveness of this technology;
- Maturity meters to monitor curing of concrete pavement to allow for faster reopening of roadways; and
- Ground penetrating radar to calculate the thickness of pavement.

Collectively, these technologies can help decrease construction times and reduce costs.

In addition, Ohio DOT has a specification for using magnetic imaging technology (MIT) for dowel bar alignment. The Wisconsin DOT has experimented with its use for this application. The MIT is able to quantify the alignment of the dowel bars based on translation, skew, and tilt. The Iowa DOT has used MIT to measure the depth of Portland Cement Concrete pavement nondestructively. A metal plate that is 0.6 mm thick is placed on the subgrade prior to paving. This is used for projects with greater than 50,000 square yards.

In terms of personnel, many DOTs are experiencing fiscal constraints that are causing them to reduce staff, and some agencies are shifting certain inspection and testing work to contractors. With the contractor performing QC testing and the DOT following with an assurance test, some states are allowing the contractor to perform extra tests that are then considered QA tests by the DOT.

When these extra tests are performed, the DOT does check that the tests procedures are performed correctly. The assurance tests performed by the contractor's testing personnel still must be verified with the results of the contractors QC testing. The procedure is the same – the only difference is who performs the assurance test.

The Illinois DOT developed an Expert System to assist with scheduling. It provides updated guidance to account for production rates, weather, fabrication times, special events, and other factors. It is an excellent training tool for new estimators and is a good check for those who are experienced.

The Utah DOT has leveraged the experience of retired construction estimators by hiring them to supplement and guide younger or less experienced staff. The accuracy of their estimates has significantly improved.

3.4.2 Gaps and Needs

Agencies are looking for successful practices that help them find a balance among effective QA sampling for inspection given cost considerations and continuous agency encouragement to limit staffing levels.

Several peer exchange participants discussed the desire to use a risk assessment to systematically evaluate the frequency and need for testing. It is important to focus on meaningful testing, and this practice may also be helpful to allow for a reduced frequency in certain situations. New Hampshire has conducted a risk assessment of their testing processes. The challenge is the time to conduct the review. The payoff is the optimized use of the limited testing resources. The group at the northeast peer exchange elected to create and submit a research problem statement to the AASHTO Subcommittee on Construction for this topic. The results of this research can be found in NCHRP Project 10-89 *Best Practices Guidebook for Optimal Construction Inspection*.

3.4.3 Actionable Takeaways for State DOTs

- Develop guidance for how to train inspection and testing staff on the most critical work items. Examples include Arizona's Quantlist software and Florida DOTs Guidelists;
- Create processes or "checklists" to ensure consistency of QA and QC levels state-wide, especially for QA of local public agency programs and projects. Notably, there has been a formal national review on this need which resulted in FHWA research and a publication entitled *Analysis of Construction QA Procedures on Locally Administered Federal-aid Projects,* due out the summer of 2014.
- Several agencies were looking for best practices for inspection and QA/QC of innovative construction techniques. The EDC initiative has produced valuable information on techniques that provide for enhanced QA, such as stake-less technology, intelligent compaction, and GPS-enabled embankment/excavation.

The following table includes links to further information on agency practices.

Table 6. Notable Agency Practices in the Construction Quality Focus Area - Inspection

Inspection	
Implementing Innovative Practices and Tools for Inspection	
Information on IC, implementation, and findings from a pooled fund study	http://www.intelligentcompaction.com/
NCDOT Inspection Training	http://www.bae.ncsu.edu/workshops/dot/index.html
NCDOT Inspection	https://connect.ncdot.gov/resources/Materials/Pages/default.aspx
Tennessee (TDOT) Staff Matrix for Identification of Training Needs for Consultant Inspectors	http://www.tdot.state.tn.us/construction/CEI_Advertisement_plans/2012_29_January/Staff%20Chart%20-%20All%20Projects.pdf
Innovative Practices and Tools for Inspection	
Expert System for Scheduling	http://ict.illinois.edu/publications/report%20files/FHWA-ICT-11-089.pdf
FHWA Loaned Equipment	www.appliedpavement.com/techResources_equipLoanProg_home.html
Laser Scanning	http://ict.illinois.edu/publications/report%20files/fhwa-ict-10-068.pdf
Assessing Inspection Levels of Effort with Risk-Based Processes	
Arizona DOT FAQs and link to Quantlist	http://www.azdot.gov/Highways/ConstGrp/Value_Quality/FAQ_Quantlist.asp
Caltrans Computer Based Training Resources	http://www.dot.ca.gov/hq/construc/training/
Florida DOT Construction Guidelists and Critical	http://www.dot.state.fl.us/construction/CONSTADM/Guidelist/GuideIndex.shtm
Nevada Contractor Information Website	http://www.nevadadot.com/Doing_Business/Contractors/Contractor_Information.aspx
Utah Inspector Guide and Training	http://www.udot.utah.gov/main/f?p=100:pg:0:::1:T,V:1572,65102
FHWA Alternative Payment and Progress Reporting	http://www.oregon.gov/ODOT/HWY/CONSTRUCTION/pages/adr_program.aspx
Idaho Work Zone Safety and Mobility Program	https://itd.idaho.gov/highways/docs/Work%20Zone%20Safety%20and%20Mobility%20Program.pdf
Oregon Contractor Evaluation Form	ftp://ftp.odot.state.or.us/techserv/construction/Construction%20Forms/2884_Instructions.pdf

Inspection (cont'd)	
Oregon Prequalification Form	http://www.oregon.gov/ODOT/CS/CONSTRUCTION/Pages/Prequalification.aspx
South Dakota Authorization Form for Preconstruction	http://www.sddot.com/business/contractors/docs/Precon/DOT270AuthorizationFormForPreconstructionMeeting.pdf
South Dakota Special Provision for Contractor Administered Preconstruction Meeting	http://www.sddot.com/business/contractors/docs/Precon/ContractorAdminPrecon.pdf
Washington Research Report on Materials Risk	http://www.wsdot.wa.gov/research/reports/fullreports/745.1.pdf

Table 7. Notable Agency Practices in the Construction Quality Focus Area – Performance Measures

Performance Measures	
Developing and Tracking Meaningful Performance Measures	
Caltrans Construction Performance	http://www.dot.ca.gov/hq/construc/training/
Florida DOT Performance Measures Reports	http://www.dot.state.fl.us/construction/CONSTADM/reports/cost&timeNEW/ConstructionOfficeReport.shtm
Florida DOT Quarterly Performance Measures Reports	http://www.dot.state.fl.us/construction/CONSTADM/reports/perfmeasNEW/PerformanceMain.shtm
North Carolina DOT Dashboard	https://apps.dot.state.nc.us/dot/dashboard/
Virginia DOT	http://dashboard.virginiadot.org/
Information on Missouri DOT's performance measures being tracked	http://www.modot.mo.gov/about/general_info/Tracker.htm

3.5 Innovation

In the Innovation focus area, practitioners selected from among the following core elements to identify agenda topics for the regional peer exchanges:

- Alternative Contracting
- Innovative Practices, Processes, Products and Equipment
- Recognition

Innovative Practices, Processes, Products and Equipment was on the agenda for four out of the five exchanges.

3.5.1 Noteworthy Practices

Agencies noted that they encourage contractors to submit value engineering proposals in an effort to tap private sector innovation for cost efficiencies. In contrast to value engineering during design, in this scenario contractors submit a suggestion to improve efficiency and reduce costs, and, once accepted, a formal change order is initiated. The contractor then typically splits the cost savings with the owner-agency.

In Missouri, it is common to allow contractors to submit Value Engineering Change Proposals (VECP). If accepted, the savings to the project are split 50-50 with the contractor. Missouri DOT has encouraged more VECP by allowing practical design changes that are relatively simple. The project savings from these changes are shared with the contractor, but at a 25 percent share.

In the northeastern states, warm-mix asphalt is an emerging materials technology that holds significant promise. Acceptability of the warm mix additives has been coordinated through the North East Asphalt User/Producer Group (NEAUPG). This effort is being led by New York DOT.

Several States use prefabricated small structures and decks on construction projects, including Connecticut, Delaware, Maine, New Jersey, and Maryland. This has the tremendous advantage of accelerating construction to minimize user delays in the work zone. It also has tremendous potential for benefits such as improved worker safety.

3.5.2 Gaps and Needs

Agencies cited the need for more widespread use of innovative technologies and equipment such as GPS rovers and mobile LiDAR as a basis for 3D model data collection, self-propelled modular transporters for moving bridge sections into place and reducing construction time, automated machine guidance and control for string-less paving and stake-less grading, and intelligent compaction. Another item that is related to this focus area is contracting practices. Agencies cited the need to expand the use of alternative contracting practices (also referred to as innovative contracting in some references) such as design-build, A+B bidding (including costs based on calendar days to complete in addition to construction costs), and alternate technical concepts that allow innovation for limited areas of the project.

Innovation: Three of the top 10 selected peer exchange topics nationally were in this focus area – allowing contractors to implement innovative construction methods (20 agencies), creating a comprehensive innovative contracting process (16 agencies), and implementing innovative practices and products (16 agencies).

Agencies are also using pre-fabricated bridge elements to reduce exposure and impacts compared with traditional construction methods. One primary benefit from this practice is reduced user delays in the work zone due to shortened construction duration. This construction technique has some opposition because of the perceived

threat of reducing construction jobs. A consistent message from the States and contractors will help to make sure this valuable construction process continues.

3.5.3 Actionable Takeaways for State DOTs

- An innovative area where more guidance and technology transfer is needed is in using alternate materials and recycled products. Practitioners noted that there is more of an industry focus on this issue during periods of economic slowdown. Contractors in the Chicago, Illinois, area are using this technology and Illinois DOT is a contact for additional information.
- Civil Integrated Management (CIM) is an area of further discussion and exploration for State DOTs to pursue. Practitioners indicated that when linking multiple project components (letting, design, assessment, legal, etc.), a CIM process is undertaken that can benefit agencies through innovative cost reductions, improved efficiencies, and integrated project and program management.
- FHWA has a program on Intelligent Construction Systems and Technologies (ICST) to address gaps identified from project development through construction and develop guidance for State highway agencies to assist them in determining how best to use ICST to improve accelerated delivery.
- FHWA's EDC Program has published information and training on the use of slide-in bridge technologies, 3D engineered models for construction, and automated machine guidance for grading and paving.

The following table includes links to further information on agency practices.

Table 8. Notable Agency Practices in the Innovation Focus Area – Performance-based Contracting

Performance-based Contracting	
Best-Value, Performance-Based Contracting	http://www.fhwa.dot.gov/programadmin/contracts/sep14_mi_m39.cfm
All Michigan DOT Manuals and Guides	http://www.michigan.gov/mdot/0,1607,7-151-9622_11044_11367---,00.html
Michigan DOT Innovative Construction Contracting Manual	http://www.michigan.gov/documents/mdot/Innovative_Construction_Contracting_340000_7.pdf
Pooled Fund information	http://www.pooledfund.org/Details/Study/489

3.6 Communications – Data and Information Sharing

In the Communications focus area, practitioners selected from among the following core elements to identify agenda topics for the regional peer exchanges:

- Public Relations
- The NEPA Process, and Internal and External Feedback between Construction Staff and Others

Although these topics were not selected for any peer exchange agenda, communications-related issues were brought up during open discussion periods that addressed other regional priorities.

National Environmental Protection Act (NEPA) Process

The topic of creating an effective public relations program to mitigate public impact was rated in the top ten priority list by 44% of agencies.

Another topic, ensuring environmental commitments in the NEPA document are satisfied, was rated as a priority by 40% of agencies.

3.6.1 Noteworthy Practices

Public Relations

Relationships between owners and industry organizations such as the Associated General Contractors of America (AGC) are also important to foster and develop. In addition to internal coordination with project teams, agencies are also using a variety of external communication and information sharing techniques to keep the public involved, including outward-facing construction performance measures and websites with specific project information (completion dates, impacts to plan for, etc.).

The NEPA Process, and Internal and External Feedback between Construction Staff and Others

One of the CPN trends for this topic is in the use of partnering concepts to enhance working relationships between owner-agencies and contractors. Several agencies noted that joint efforts are underway to implement plans to address items such as plan quality, succession planning, and contractor and project performance evaluations. For example, in an effort to renew emphasis on partnering on highway construction projects, Nevada DOT is taking the lead on planning, organizing, and conducting a workshop on "how to partner." The goal is to bring together national leaders in the subject and discuss and document best practices in partnering. The product will be a "How to Partner in the 21st Century" best practices guide. The workshop is being scheduled for spring 2015.

Another topic of great interest nationally is the use of post-construction reviews, with one agency noting that their agency's reviews occur one year after project acceptance. Some post-construction reviews use construction and design staff to determine early design activities that can make for more

efficient construction practices. The application of multi-disciplinary teams (environment/scoping, design, construction, maintenance/operations) on project reviews is an important component of any project or programmatic assessment.

Both the contractor and the DOT generate information and data necessary for them to conduct their business. Much of this information is collected electronically and used by each party individually. The consensus among many participants was that an effort to share information would be beneficial to the completion of a quality project. One way might be to have contractors obtain copies of DOT checklists.

Though not a separate subject, the question of data sharing came into the discussions many times. The general consensus of the participants was the belief that more information should be shared. DOTs and contractors have advocated partnering as a way of doing business, which emphasizes a team effort. To adopt a partnering role, agencies are encouraged to share information among the project stakeholders including any electronic or digital data available.

3.6.2 Gaps and Needs

- Documentation of innovative ways to engage the public prior to construction to reduce complaints during construction.
- Analysis of timelines and processes for performing post-construction reviews and sharing best practices from States.

3.6.3 Actionable Takeaways for State DOTs

- Encourage contractor input on the process through AGC and private sector representatives that attended peer exchanges.
- Developing approaches for sharing appropriate information between DOT and contractor would be a good follow-up action.

The following table includes links to further information on agency practices.

Table 9. Notable Agency Practices in the Communications Focus Area – Post Construction Reviews

Post Construction Reviews	
Conducting Post Construction Reviews	
Virginia DOT Design Quality Index Evaluation Form	http://vdotforms.vdot.virginia.gov/SearchResults.aspx?strFormNumber=LD-433
Kentucky Transportation Cabinet post-construction reviews	http://transportation.ky.gov/highway-design/pages/post-construction-review.aspx

3.7 Moving Forward – Insights into Future Practices

As the implementation of MAP-21 progresses, agencies will be developing and enhancing processes for putting performance measures and asset management plans into practice. Figure 4 shows examples of traditional practices along with how the CPN, MAP-21, and the EDC Initiative are designed to enhance future practices.

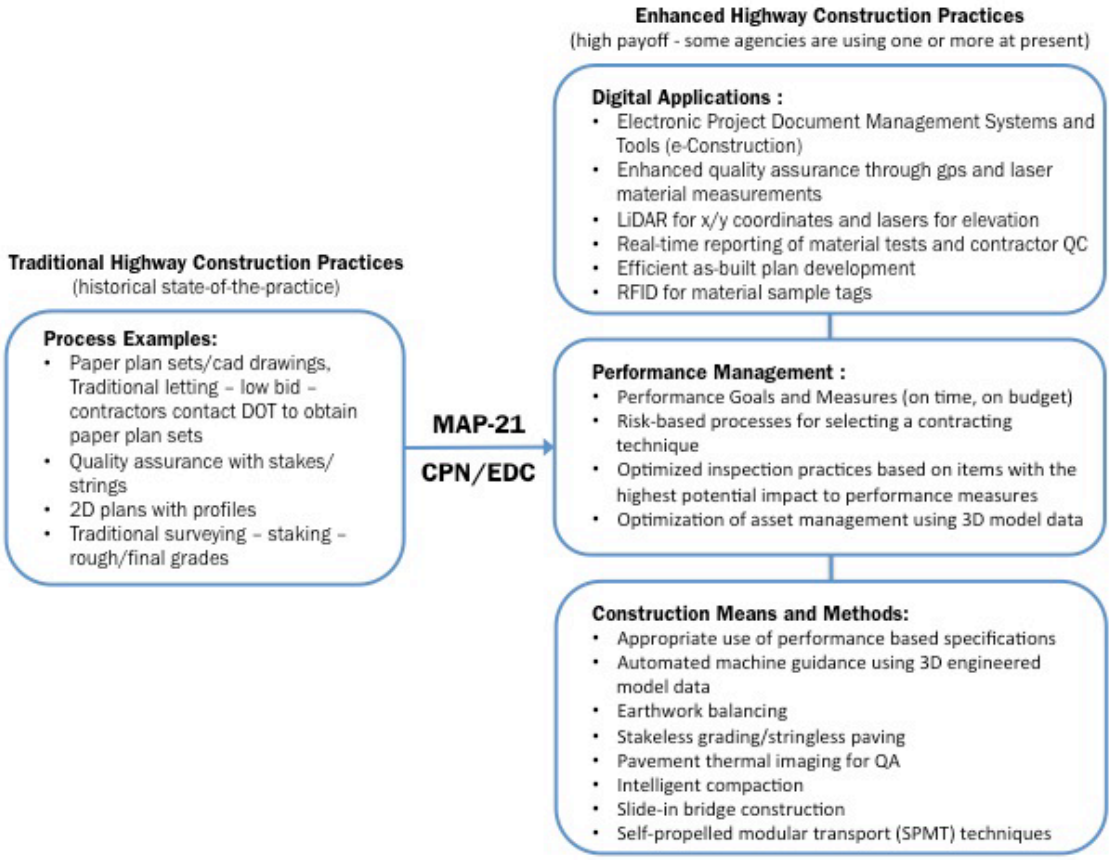


Figure 4. How the CPN Is Helping Advance Highway Construction Practices Nationally

During peer exchange discussions as well as in narrative responses to the PI Tool, practitioners made several suggestions that may help agencies evaluate the potential for integrating new practices into construction delivery programs. These items include:

- Creating a uniform "language" in design documents (in the sense of integrating design based on constructability) that relates directly to construction to minimize any future constructability issues in the field that could have been avoided with design modifications. By integrating the two processes, design information can be better shared with contractors and construction input can be gathered during design in order to deliver a high quality project at a lower cost. Some agencies already perform post-construction reviews that bring

together designers and construction engineers to discuss design enhancements that optimize construction activities.

- Exploring new ways to administer design-build projects. The design-bid-build contracting method will likely remain the primary technique, but there is a need to evaluate new methods of getting the same level of oversight (optimization of inspection resources) without compromising in other areas.
- Applying lessons learned and guidance on new alternative contracting methods; how each method is used; what situations work best for construction manager/general contractor (CM/GC), and for design-build; and applying technology to projects. The University of Colorado TP5 (260) Pooled Fund Efforts and FHWA Research "Quantification of Cost, Benefits and Risk Associated with Alternative Contracting Methods and Accelerated Performance Specifications" provides information that can assist with this activity.
- Learning about best practices for streamlining the permitting process for contractor value engineering or alternative construction methods that involve modifying project permits.
- Using creative ways for dealing with staffing cuts and limited resources.
- Using performance-based construction specifications in appropriate situations. This is in addition to using the current methods-based construction specifications where appropriate. One challenge involves applying techniques that do not preclude any potential bidders due to the need for any type of specialized equipment or resources.
- Transferring technology from State to State on staffing organization techniques, such as having one person responsible for design, materials, and construction as is the case with some DOTs currently.
- Fostering implementation of infrastructure information management software tools for construction management, collaboration, and record-keeping. Also known as e-Construction, this initiative specifically brings electronic document management systems to all phases of construction, from pre-bid documentation (design plans and specifications), to post-construction items such as as-built drawing and also includes financial transaction.

4. SUGGESTIONS FOR IMPLEMENTATION

The following suggestions for implementation are categorized by overarching topic area. These items comprise the identified best practices that resulted from the peer exchanges.

Innovative Inspection and Oversight

- Review construction inspection processes programmatically for optimization of resources. Consider use of contractor testing in acceptance decisions, if applicable for a given State.
- Use technology such as laser scanning for earthwork quantity calculations and radio frequency identification device (RFID) tags for linking inspection and testing data to samples.
- Use formal checklists for inspection.
- Use maintenance personnel for construction inspection.
- Develop risk-based inspection processes, especially for materials testing.
- Monitor traffic control setup to ensure proper application and consider penalties for time periods after notification and until appropriate changes are made.

Performance Measurement

- Conduct formal evaluations to assess the causes of change orders.
- Share tracked performance measures with the general public.
- Evaluate the performance of motorist and pedestrian access to businesses during construction.

Evaluation and Assessment

- Request evaluation of the project design by the contractor after completion and use the results to improve project delivery.
- Request contractor rating of resident engineer performance – this could be used as a qualitative measure for improvement in practice to ensure proper project oversight without too much focus on ratings.
- Use project evaluation checklists and reviews during design to improve constructability.

Alternative Contracting Methods

- Develop and implement training on understanding quality systems for design-build projects.
- Use available guides and manuals from Michigan and Colorado for application of methods by project type.
- Consider warranties to settle 'materials out of specification' claims as an option, along with lump sum bid and pay items.

Digital Jobsite

- Apply electronic signatures for approvals of change orders to streamline the process.
- Use a digital file sharing system in project management.
- Implement field data collection technologies such as tablets, video, LiDAR, and maturity meters.

Partnering and Dispute Resolution

- Require partnering by specification and make it a culture, not a strategy.
- Co-locate DOT, contractor, and FHWA staff for large projects.
- Implement claims avoidance training.
- Share appropriate information electronically with project stakeholders (e.g., checklists).
- Use joint utility plans for sharing responsibility for utility work coordination between owner and contractor.
- Consider early notification of intent to file a claim immediately after the occurrence.

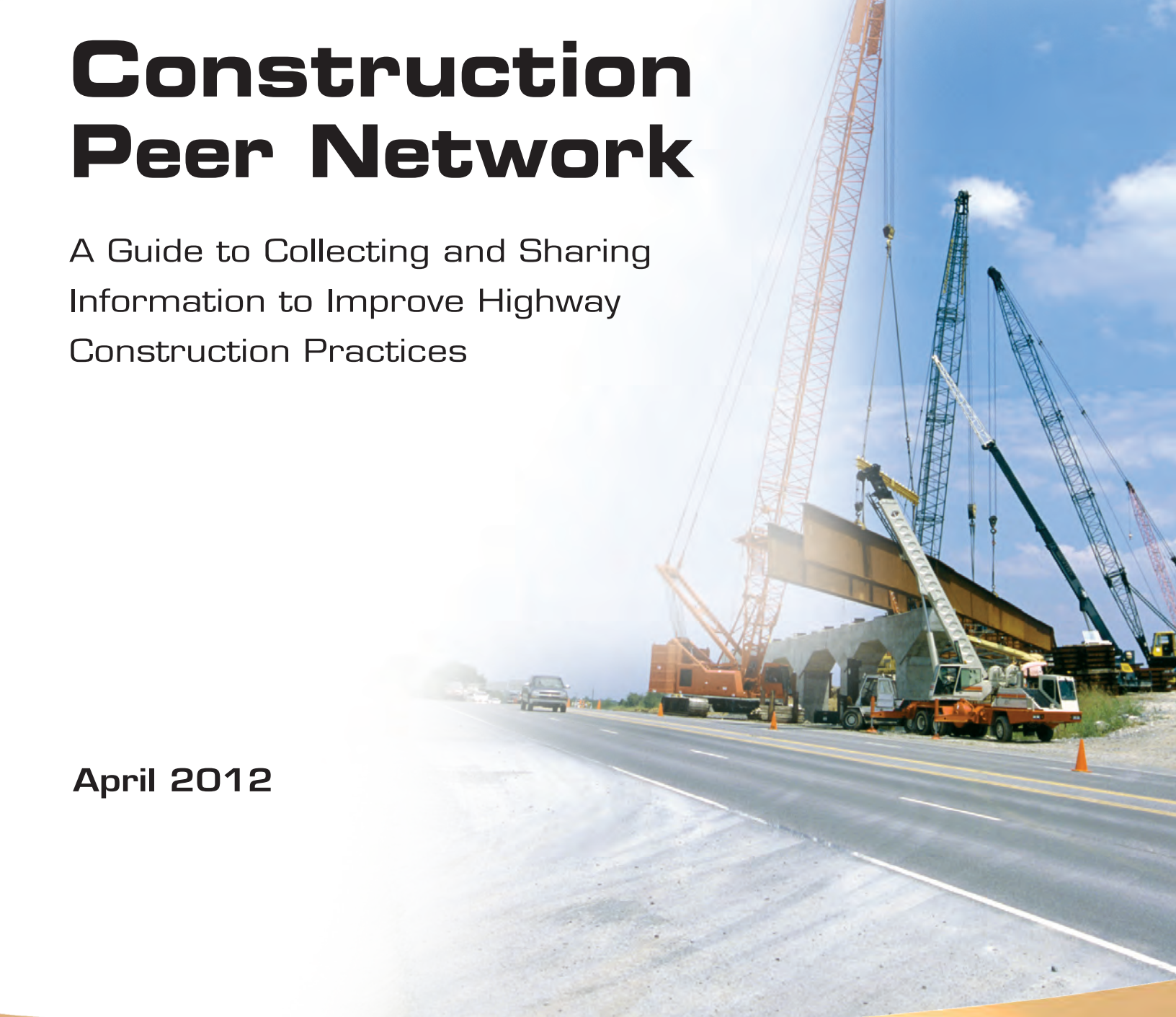
Project Supervision and Staffing

- Implement mentoring by matching experience inspectors with newer staff and succession planning to mitigate knowledge lost due to retirements.
- Offer formal career training and advancement opportunities to testers and inspectors.
- Seek resources such as retired contractor estimators for expert input.
- Cross-train and use construction staff for maintenance and vice-versa.
- Allow contractors ownership of the preconstruction conference.

APPENDIX A. CPN USER GUIDE AND PI TOOL

Construction Peer Network

A Guide to Collecting and Sharing Information to Improve Highway Construction Practices



April 2012

AASHTO The Voice of Transportation
AGC of America The Associated General Contractors of America Quality People. Quality Projects.
ARTBA American Road & Transportation Builders Association
U.S. Department of Transportation Federal Highway Administration

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A Note From the CPN Sponsors

Construction leaders & innovators –

We need your help to move transportation construction to the next level for Americans and our economy….and, why reinvent the wheel? Whatever we can learn from one another to become more effective is especially important as States and localities across the country seek to maximize the benefit of limited funding and resources.

With this in mind, AASHTO, ARTBA, AGC and FHWA have collaborated on the Construction Peer Network (CPN) as a structured approach to learn from one another. You are contributing to this landmark effort to gather and share exemplary construction practices.

And the CPN represents just one piece of a larger effort by our organizations, working through our long-standing partnership, to better serve our customers through adoption of new technologies, improved processes, and innovative practices. While peer exchanges will produce very tangible benefits for a number of construction programs, the more important outcome is the transformation of the way we do business. Using a peer network approach to improve construction safety and quality, and to reduce time and cost, is simply smart. It's what our customers want and deserve.

Thank you for investing your time to support this initiative. We expect you will see a good return; both for your state and for our construction industry.

Michael P. Lewis, PE
Vice President, American Association of State Highway and Transportation Officials
Director, Rhode Island Department of Transportation

Butch Wlaschin, PE
Director, Office of Asset Management
Federal Highway Administration

Brian Deery
Senior Director, Highway and Transportation Division
The Associated General Contractors of America

Rich Juliano
Vice President for Federal & State Relations
Managing Director, Contractors Division
American Road & Transportation Builders Association

CPN: What Is It, and Why Is It Needed?

The United States spends billions each year to construct and maintain our world class highways, yet the CPN appears to be one of the first efforts to take a comprehensive look at State DOT delivery processes, along with partner contributions, to seek out those that have proven most effective. The CPN provides a structured approach for capturing and sharing exemplary construction delivery practices (generally those after contract award), which should provide a significant return on investment when implemented.

FHWA partnered with AASHTO, along with its member State DOTs, AGC, and ARTBA to create the CPN. The CPN's basic objective is to improve the quality of construction and the delivery of highway projects brought about as construction professionals share successful practices and innovations among their peers. The partners' vision is to facilitate and encourage widespread deployment of such practices across the nation. Ultimately, the goal of the CPN is faster, more cost-effective construction of highway projects to benefit the American public and the nation's economy.

The CPN process involves two steps: 1) gathering State practices using a Program Information Tool (PI Tool) and 2) sharing those seen as having a high return on investment at Regional Peer Exchanges. These steps are discussed in more detail later in this document. Participation is voluntary.

Benefits of CPN

The CPN offers the opportunity for communicating, exchanging knowledge, and strengthening relationships among the various partners delivering construction projects. It should benefit State DOTs and the contracting community by:

- Providing options to State DOTs for maximizing limited resources;
- Widely deploying proven practices and innovation across the nation;
- Promoting ways to use construction funding more effectively while positively impacting quality, cost, time, safety, and other important construction delivery metrics; and
- Developing or enhancing each participant's regional network of peers.

Ultimately, the CPN will lead to implementation of more effective practices and processes.

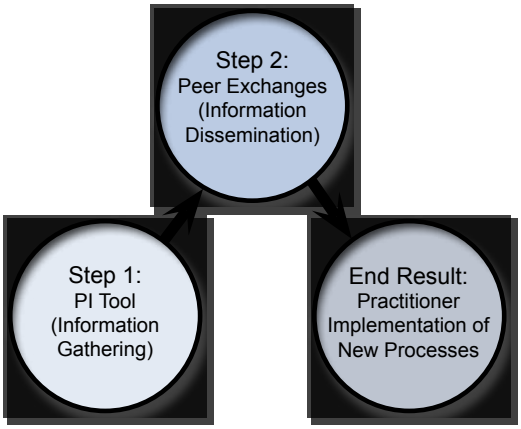

Figure 1. Construction Peer Network Process Flow

The CPN Process

The CPN follows the two-step process shown in Figure 1 to focus on practices most relevant for a given geographic region. The PI Tool assists State construction professionals with gathering information on practices in six focus areas that comprise a typical construction delivery program:

1. Project Supervision and Staffing
2. Construction Safety
3. Construction Administration
4. Construction Quality
5. Innovation
6. Communications/Data/Information Sharing

Questions were designed and developed with input from construction practitioners and key stakeholders and address several key needs cited by the highway industry, including:

- The need for State agencies to have an opportunity to describe the specific processes that work best for them;
- The need for input from contractors as part of the CPN process; and
- The need for discussion on streamlining construction processes for the benefit of key metrics such as cost and time.

The information gathered from the PI Tool will lead directly into the second step of the process – information dissemination through regional peer exchanges. Discussion topics for the peer exchanges will be based on the information gathered from the PI Tool.

The PI Tool – What Is It and How to Complete It

The PI Tool is a series of questions, prioritized by a CPN steering team, to focus on practices likely to have the greatest impact on DOT construction delivery. Input from contractor partners is also sought, and can be added via narrative responses.

The tool is presented in a matrix format that allows the user to input responses via radio buttons for various topics. It is designed to be easily completed, but also to capture detailed, valuable information that will help identify topics for each peer exchange. The PI Tool will allow users to submit results electronically. The entire PI Tool is presented at the end of this document.

Within the PI Tool there are questions for each of the six focus areas. The focus areas are further broken into core elements and functions, with the questions at the function level. A core element is a key process that occurs within a particular focus area, and a function is a direct action that is taken to implement the process. The core elements and functions that comprise the PI Tool are a result of a prioritization process the CPN steering team used to determine the final questions.

The PI Tool includes a set of matrices for each focus area and a matrix for every core element within a focus area. In each matrix, functions are listed vertically on the left and questions are listed across the top horizontally. Radio buttons allow users to document their responses to the questions asked for each function. Figure 2 shows an example core element (Determine Levels of Staffing) and associated functions.

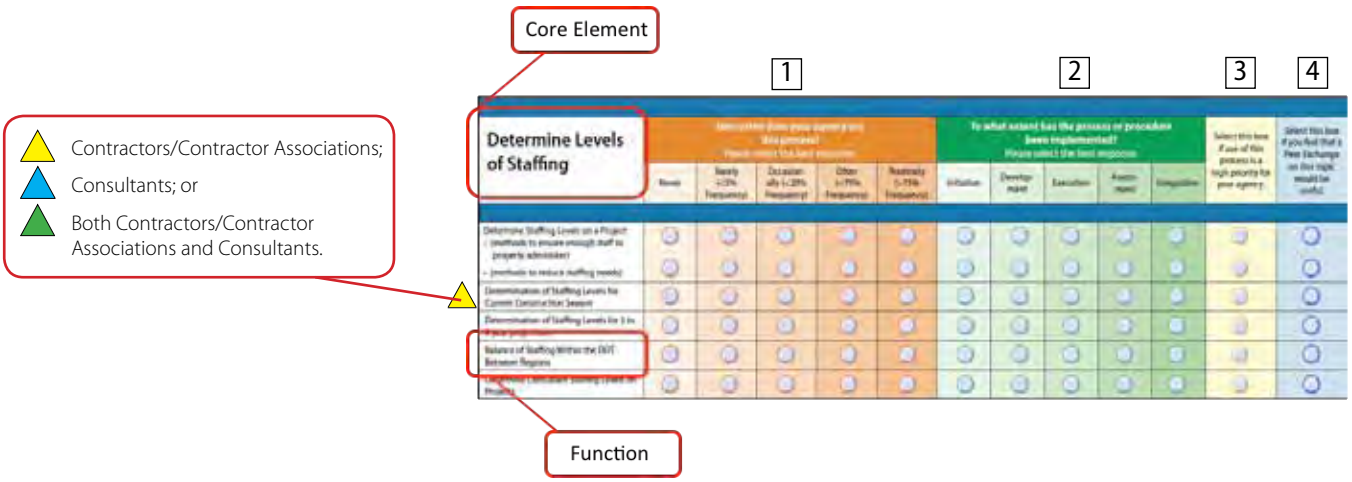

Figure 2. Example Matrix Identifying A Core Element and A Core Function within the Focus Area of Project Supervision and Staffing

Responders are asked the following five questions with regard to the specific functions listed on the left side of the matrix (the numbers above each column in Figure 2 correspond to the question and explanation provided below):

1. **How often does your agency use this practice (function)?**

   This question corresponds to the orange shaded columns shown in Figure 2 above. Select the radio button that appropriately describes how often the function is performed. Provide answers to all functions for each core element. The frequency of how often a function is performed may relate to time (i.e., how many times per year), or to the percent of overall projects. Consideration should be given to these metrics when providing a response.

2. **To what extent has the process or procedure been implemented?**

   This question corresponds to the green shaded columns in the example above, with five possible selections for the level of implementation for a specific function. It is important to determine the most appropriate response to each question based on input from discussions with key stakeholders. Table 1 shows the various levels of implementation and describes how to interpret each.

Table 1. Level of Implementation Descriptions

Level of Implementation	Description and Examples for Selection of Appropriate Implementation Level
Initiation	• Does agency management acknowledge the need for a particular item? • Has exploratory research taken place to assess the benefits of this item? • Does management support further development of this item's requirements?
Development	• Has the agency developed a plan or approach to address the item's requirements? • Has the agency started to investigate the feasibility of implementation? • Does the agency have standards and guidance to enable the item's implementation? • Does the agency have the approvals necessary for implementation? • Are resources in place to support the adoption of this item?

Table 1. Level of Implementation Descriptions (cont.)

Level of Implementation	Description and Examples for Selection of Appropriate Implementation Level
Execution	• Is the agency implementing the required activities to accomplish this item? • Is the item used statewide? Do the majority of State construction units use the item? • Has the agency allocated financial or staff resources necessary for the item's execution? • Have appropriate personnel been trained to execute the item's requirements? • Has a process owner been established?
Assessment	• Has the agency assessed how well this item performs? • Has the agency assessed the process for carrying out this item? • Has the agency implemented appropriate changes to the requirements of this item based on performance assessments?
Integration	• Has the agency integrated the requirements of this item into quality improvement processes? • Are the requirements of this item integrated into agency culture? • Are the requirements of this item included as part of the employee performance rating system?

3. **Select this box if use of this process is a high priority for your agency.**

   This question corresponds to the yellow column in the above example. Select this box to indicate that the agency would benefit from information and discussion on how to implement a particular function. This focuses on your State's priorities and will help determine areas of focus for the regional peer exchanges.

4. **Select this box if you feel that a Peer Exchange on this topic would be useful.**

   This question corresponds to the far right column in the above example shaded in blue. The response will help peer exchange planners determine if this is seen as a broader regional or national issue, or is generally a worthy discussion topic that will benefit the highway construction community.

5. **Supplemental Questions**

   Two supplemental questions are also included for each focus area, with one overall supplemental question at the end of the PI Tool to capture items not covered. An example supplemental question is shown in Figure 3. These questions allow for typed input to clarify matrix responses and to offer responders a chance to comment on topics that are not explicitly included in the matrix, such as:

   - Processes that have been implemented with exceptional results;
   - Areas of focus that should be a priority;
   - Areas of focus for peer exchanges that have not been identified in the matrices; and
   - Opportunities for streamlining or removing inefficient processes that would positively benefit cost, safety, and quality.

Focus Area No. 6: Communications/Data/Information Sharing

(To gain addition information in this focus area, please provide your answers to each question below.)

Please tell us about any other exemplary practices or processes that your agency is currently implementing related to Communications/Data/Information Sharing

Figure 3. Sample Supplemental Question

Once all responses are completed, users should review the matrices and supplemental questions to ensure that all items have been adequately addressed. Users should ensure the information is correct and complete as it will be valuable in determining the discussion topics for the peer exchange.

Saving and Submitting PI Tool Responses

Users should save their work often while completing the PI Tool. It is important to save the file using a file name that identifies your State. To do this within Adobe Acrobat, click "file" and then click "save as" and save the file with your State name included (e.g., DistrictofColumbiaPITool2011.pdf).

Finished? When complete, click "Submit" to email your responses to FHWA automatically. Be sure to "save as" and include your state in the file name prior to submitting.

The "Submit" button at the end of the PI Tool matrices automatically generates an email message with the completed PI Tool as an attachment. There are two options for submitting the form: 1) directly sending the saved file to Christopher.Schneider@dot.gov or 2) clicking "submit" and then emailing the resulting attachment. It is anticipated one completed PI Tool response will be received from each State.

The Peer Exchange

The peer exchange completes the CPN process. It offers an opportunity for practitioners to learn about new practices and processes, discuss information from the PI Tool, and network with peers.

After the States' responses to the PI Tool are analyzed, a peer exchange for the region's participants will be conducted. The peer exchange will be held approximately 3 months after the submission of PI Tool responses and will engage approximately 50 participants for 2 days of meetings. Peer exchange topics will be determined based on priority areas identified by agencies and trends in the PI Tool results for each region. Lead state presentations on successful construction practices followed by facilitated roundtable discussions will be the focus of the peer exchange. A preliminary peer exchange agenda is shown below in Figure 4.

Day 1		
Time	**Topic**	**Speakers / Facilitators**
8:00am – 8:30am	Welcoming Remarks • Discuss purpose and expected outcomes	FHWA Coordinator, TBD, Moderator
8:30am – 8:45am	Self Introductions • To get to know one another better • Housekeeping Items	All Participants
8:45am – 9:30am	Host Agency Presentation • Introduction of Host Agency's Construction Program and its perspective on how the CPN can help the state and region	Presenter TBD
9:30am – 9:45am	Break	
9:45am – 10:30am	Lead Off Presentation – Exchange Topic #1 • A Lead agency presentation on a model process or practice. Set theme for topic. • with Facilitated Q&A	Presenter TBD
10:30am – 11:30am	Participant Roundtable Discussions – Exchange Topic #1	All Participants
11:30am – 12:30pm	Lunch	
12:30pm – 1:00pm	Summary and Preview of Next Session	Moderator
1:00pm – 1:45pm	Lead Off Presentation – Exchange Topic #2 • A Lead agency presentation on a model process or practice. Set theme for topic. • with Facilitated Q&A	Presenter TBD
1:45pm – 2:30pm	Participant Roundtable Discussions – All Participants Exchange Topic #2	All Participants
2:30pm – 2:45pm	Break	
2:45pm – 3:30pm	Continue Participant Roundtable Discussions – Exchange Topic #2	All Participants
3:30pm – 4:00pm	Summary and Preview of Next Day	Moderator
3:30pm – 4:00pm	Workshop Synthesis – Themes, Issues and Conclusions	Moderator
4:00pm	Adjourn	

Day 2		
8:00am – 8:30am	Recap of Day 1 Discussion, Issues and Themes	Moderator
8:30am – 9:15am	Lead Off Presentation – Exchange Topic #3 • A Lead agency presentation on a model process or practice. Set theme for topic. • with Facilitated Q&A	Presenter TBD
9:15am – 9:30am	Break	
9:30am – 11:00am	Participant Roundtable Discussions – Exchange Topic #3	All Participants
11:30am – 12:30pm	Lunch	
12:30pm – 1:15pm	Lead Off Presentation – Exchange Topic #4 • A Lead agency presentation on a model process or practice. Set theme for topic. • with Facilitated Q&A	Presenter TBD
1:15pm – 2:30pm	Break	
2:45pm – 3:30 pm	Participant Roundtable Discussions – Exchange Topic #5	All Participants
3:30pm – 4:00pm	Workshop Synthesis – Themes, Issues and Conclusions	Moderator
4:00pm	Adjourn	

Figure 3. CPN Peer Exchange Preliminary Agenda

Using a regional approach, peer exchanges will be conducted at approximately 4-month intervals following the initial CPN roll-out. Figure 5 shows the proposed grouping of States for five peer exchange regions. Host agencies for each regional peer exchange will be confirmed as the program is implemented.

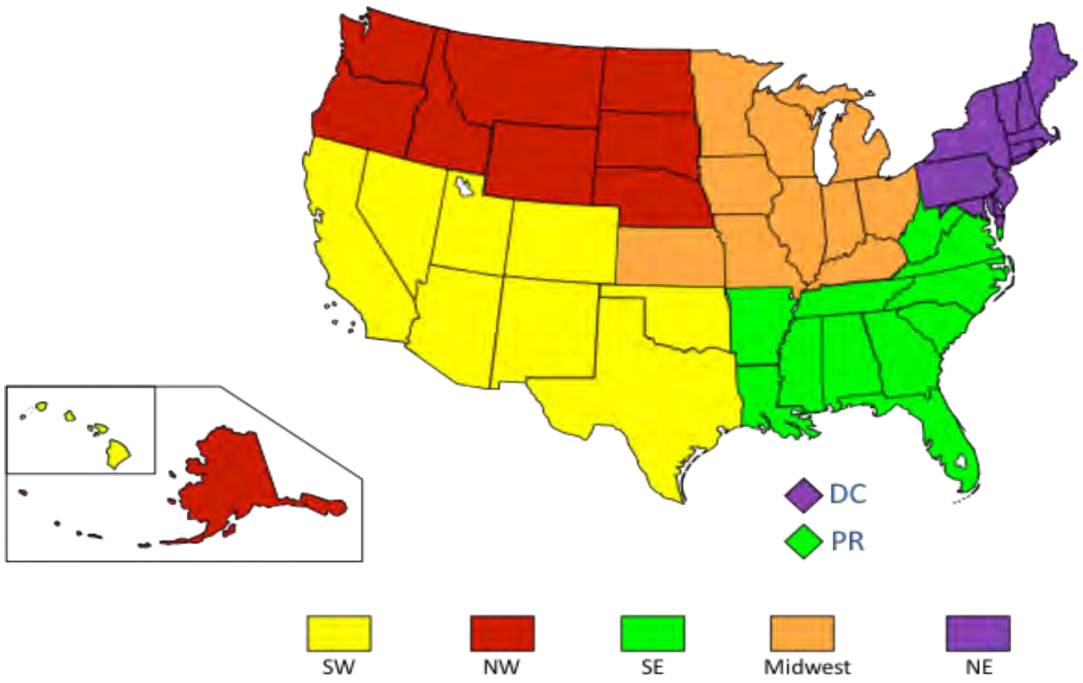

Figure 5. CPN Peer Exchanges - Proposed Regional Groups

CPN Products

The products of each peer exchange will include electronic presentations, discussion notes, action items, and plans for implementing practices. A summary report will be provided to each participant within 6 weeks of the peer exchange.

Responsibilities of the FHWA Division Office

For a State that wishes to participate, the FHWA Division Office has been asked to facilitate completion of the Pi Tool. It is recommended that the Division Office lead a structured discussion among stakeholders to develop a consensus on each question from the PI Tool matrices. One method to begin discussion and work towards a consensus response is to have key stakeholders answer the PI Tool individually and compare or average the results.

The purpose of this discussion is not merely to document results, but to improve communication and gather information with the goal of improving processes and practices for the benefit of construction program delivery.

A meeting and consensus may be difficult to arrange, so it is left to each State to respond in the best manner it can, with an eye towards providing accurate information to support the peer exchange and benefit construction across the country.

The following ideas are presented to assist with the structure of any group discussion.

Possible questions for a stakeholder meeting

- Do all stakeholders have the same response regarding these issues?
- What steps have they taken to address these issues?
- Have contractors, contractor associations, and/or consultants provided input where appropriate?
- What are the ramifications of these issues for various stakeholders?
- What are some strategies that should be adopted to address these issues?
- Are there additional details (e.g. constraints, time frames, routines, etc.) that may help the group to better understand the response?
- What are some of the most effective and innovative practices in our state?

What the facilitator can do to manage a successful meeting

- Become familiar with the CPN User Guide and PI Tool matrices;
- Identify a group of agency stakeholders that represent the six focus areas;
- Invite stakeholders and provide them with the PI Tool matrices to review, and possibly complete, before the meeting; and
- Set an agenda that organizes discussion of the PI Tool and assigns expected time limits for each topic. Consider a multi-voting and averaging approach to gain rapid consensus after discussion. Assign a note taker to gather other comments for the supplemental responses.

Input from key stakeholder groups

Private sector groups play a key role in construction processes and will have valuable input on the responses to the PI Tool. To facilitate gathering this input, the PI Tool has color-coded functions where input from contractors, contractor associations, consultants, or a combination of these groups is recommended. Additional comments may be added in the boxes to clarify diverse answers or other partner perspectives on a question.

- Contractors/Contractor Associations;
- Consultants; or
- Both Contractors/Contractor Associations and Consultants.

Frequently Asked CPN Questions and Answers

Q: How does the CPN differ from other ongoing initiatives, such as Every Day Counts, Highways for LIFE, the AASHTO-AGC-ARTBA-FHWA Work Group, Civil Integrated Management (CIM) workshops, etc.?
A: The CPN considers a state's entire set of construction delivery processes, generally after contract award, looking for exemplary practices, both leading edge and traditional. In general it does not focus on technologies. The CPN will be coordinated with other efforts so as to avoid duplication as much as possible.

Q: Is participation voluntary and, if so, why should a State do so?
A: Yes, participation in the CPN is voluntary. However, wide participation will contribute to a better understanding of the construction state of the practice, as well as provide an opportunity to participate in the peer exchange. The PI Tool will guide the agenda for peer exchanges, and States will benefit both from sharing best practices and from learning from neighbors. Maximizing participation will enhance the end result – better construction programs and products.

Q: Can I participate in more than one peer exchange?
A: We are planning peer exchanges by region of the country, and expect that participants from each region will attend the peer exchange for their particular region only.

Q: Do I need to complete the PI Tool prior to the peer exchange? How long will it take to complete?
A: Yes, we will use the results of the PI Tool to determine the highest priority topics for each peer exchange. We anticipate that the PI Tool will take approximately one-half day to complete.

Q: What will FHWA do with data? Will you compare States?
A: Primarily, we will use the data to support the development of each peer exchange, and use of the results will be guided by a steering team that includes representatives from States and AASHTO. We will not publish data identifying any State without their permission. If desired, we can help a State see where they stand with respect to the state of the practice in any particular area surveyed. Our action-oriented peer exchanges will encourage each State to implement one to three new practices. There is no compliance requirement for these activities.

Q: Will FHWA fund travel to peer exchanges?
A: Yes, the current plan is to fund travel for two representatives from each State DOT and one from each FHWA Division office. We recommend these be staff who complete the PI Tool and that regularly implement the State's construction processes.

Q: How will the success of the CPN be measured?
A: Success will be measured through feedback from participants, implementation of exemplary practices, and measured benefits such as cost/time/quality/resource optimization (to the extent that agencies have documentation of these benefits). We will administer evaluations for the PI Tool and Peer Exchanges. We will also follow up to assist States with implementation and determine lessons learned and successes.

Q: What are some of the other products of the CPN?
A: The peer exchange will include some action items and implementation planning that FHWA can follow up at regular intervals. Follow-up is not a requirement but will help with implementation. Those exemplary practices that are identified, and the results of peer exchanges, will be documented and made available to all participants. FHWA will help facilitate future contacts between States to assist in sharing detailed information for implementation, as necessary.

Q: How long will the CPN continue into the future?
A: Current plans are for 5 peer exchanges to cover all States (including Puerto Rico and the District of Columbia). See Figure 5 for a regional breakdown of the planned peer exchanges.

Additional help is available for any questions you may have or assistance you may need, including:

- Facilitating the PI Tool discussions and completing the PI Tool;
- Becoming a speaker for a peer exchange; and
- Hosting a peer exchange.

Please contact:

FHWA Headquarters

Chris Schneider
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FHWA Resource Center

David Unkefer
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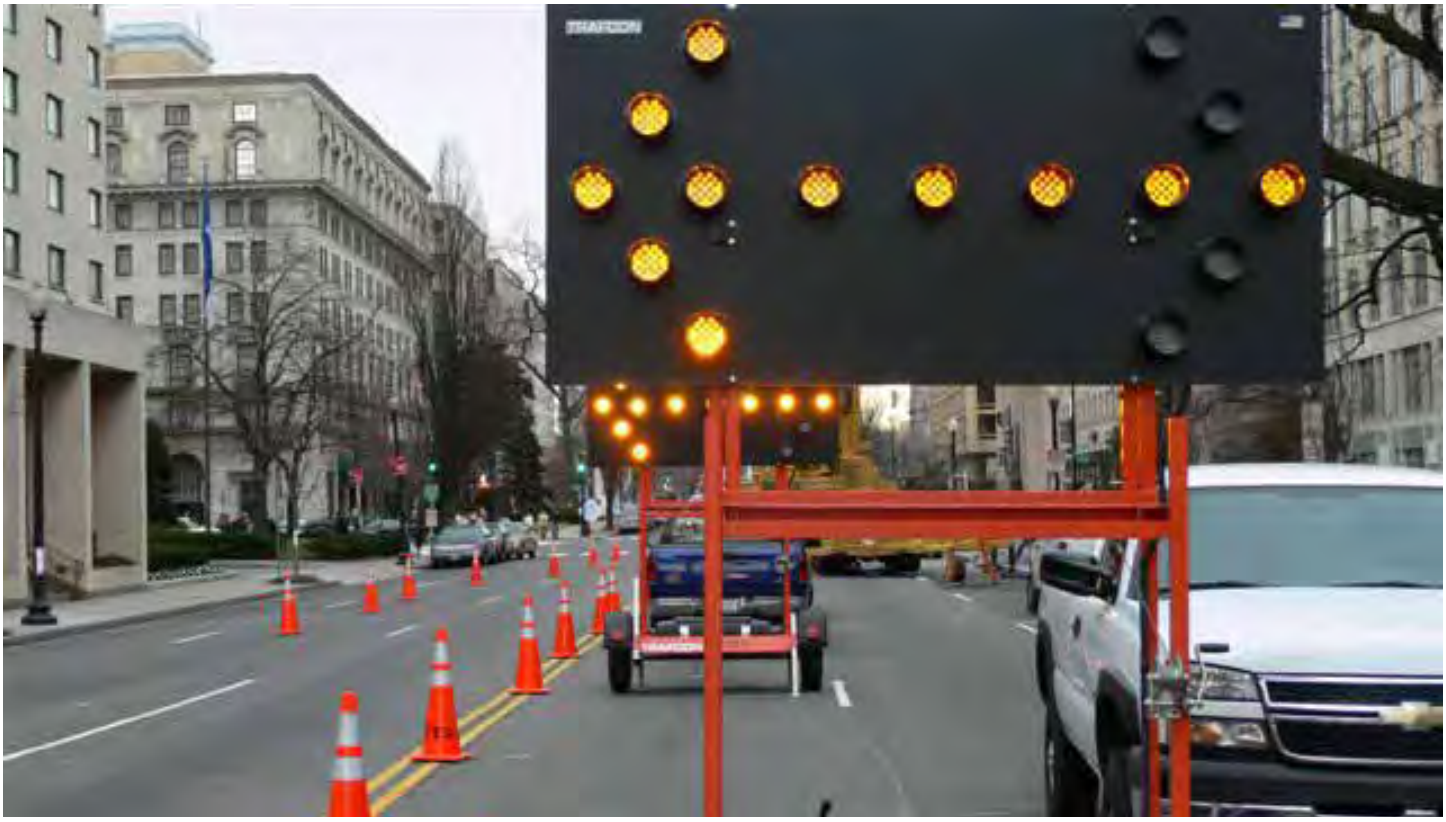


CPN Program Information Tool

Focus Area No. 1: Project Supervision and Staffing

Project supervision and staffing issues can affect the implementation, management, and outcomes of construction activities. Agencies manage staff both internal to the organization, as well as external staff such as consultants and contractors. The project team is comprised of the people who have assigned roles and responsibilities for managing the project. It is imperative that projects are adequately staffed with the appropriate level or number of staff as well as staff that is appropriately qualified.

Ensuring adequate staffing levels and qualifications can be challenging in today's environment, and attention should be paid to the needs of both internal and external staff such as training, succession planning, and qualifications. With hiring freezes there are often an increased number of vacancies and with tight budgets there is often limited funding to hire consultants to fill the gaps. Further, many states are reporting higher turnover as staff retire or depart for higher paying consultant jobs. If vacancies are filled, then the newer staff does not often have the same level of experience and qualifications. Ensuring the projects have the proper number of appropriately qualified staff to administer the contract can be a challenge.

The purpose of this focus area is to identify creative practices and processes to address these challenges. Agencies often develop plans for how to handle attrition, qualifications of staff, training needs, and privatization practices. Once privatization occurs, agencies also communicate often with consultants and contractors, establish expectations, goals and objectives for a project, and assist the private sector by developing policies for certification and sources of training.

The core elements identified with project supervision and staffing have been identified as: determine staffing levels on projects; establish qualifications for staff, consultants, and contractors; and establish privatization practices.

1.1 Determine Levels of Staffing

To some degree staffing levels are determined for all projects. However, there are differences between State DOTs regarding the frequency and complexity of the staffing analysis. Staffing levels may be determined on a project-by-project basis, annually, and / or over an extended period of time such as 3 to 5 years. Sometimes it is done in a very simple manner based on availability of DOT staff and funds available for consultants. Sometimes it takes into account the staff experience and project complexity. Sometimes it may be a formal risk assessment process. In these challenging times of limited staff, training resources, and time, agencies develop creative ways to optimize the productivity of current staff members and prioritize needs. Existing staff may be used more efficiently by cross-training design and construction so construction staff can help design in the winter. Maintenance forces could supplement construction staff in the summer. Long-range planning may allow for staffing to be shifted from one Region to another. The need for consultants to supplement DOT staffing levels can be identified in advance and communicated. That way, consultants can better plan the workforce they need to meet the needs of the owner. Some may conduct an assessment of the feasibility of reducing staff using remote project monitoring, automated construction management, shifting responsibility to the contractor and/or a formal risk assessment to identify areas for reduced staffing.

Determine Levels of Staffing	How often does your agency use this process? Please select the best response.					To what extent has the process or procedure been implemented? Please select the best response.					Select this box if use of this process is a high priority for your agency.	Select this box if you feel that a Peer Exchange on this topic would be useful.
	Never	Rarely (<5% Frequency)	Occasion-ally (<20% Frequency)	Often (<75% Frequency)	Routinely (>75% Frequency)	Initiation	Develop-ment	Execution	Assess-ment	Integration		
Determine Staffing Levels on a Project • (methods to ensure enough staff) • (methods to reduce staffing needs)	○ ○	○ ○	○ ○	○ ○	○ ○	○ ○	○ ○	○ ○	○ ○	○ ○	○ ○	○ ○
Determine Staffing Levels for Current Construction Season	○	○	○	○	○	○	○	○	○	○	○	○
Determine Staffing Level Contingencies (based on contractor schedules, emergency projects, retirement, lag between award and construction)	○	○	○	○	○	○	○	○	○	○	○	○
Determination of Staffing Levels for 3 to 5 year projections	○	○	○	○	○	○	○	○	○	○	○	○
Balance of Staffing and/or Projects Within the DOT Between Regions	○	○	○	○	○	○	○	○	○	○	○	○
Determine Sharing of Staffing and/ or Projects (construction using maintenance staffing, maintenance running construction projects)	○	○	○	○	○	○	○	○	○	○	○	○
Determine Consultant Staffing Levels on Projects	○	○	○	○	○	○	○	○	○	○	○	○

Reset Matrix

1.2 Establish Qualifications for Staff, Consultants, and Contractors

Agencies also use innovative practices to help mitigate issues with attrition due to a retiring work force. This can help maintain expertise and continuity of knowledge. Such practices may include requirements, policies, mentoring programs, succession plans, etc. The qualifications are much more than just the years of experience. Agencies are challenged with the need to ensure that project staff, consultants and contractors have the necessary experience and training to administer the project efficiently and successfully. There may be creative practices or processes. Project staffing qualifications may be developed that identify the field experience, mentoring, classroom training, and certification needed for success. Requirements may be established for certified construction inspectors, or requirements may be extended to include project engineers, resident engineers and construction engineers. Training can be developed on well documented processes and procedures to shorten the learning curve. Succession planning may be formally implemented so staff members understand the competencies needed for promotion and the DOT has a systematic program to allow employees to gain the necessary competencies. Contractor pre-qualification programs may also be shown to make improvements.

Establish Qualifications of Staff, Consultants, and Contractors	How often does your agency use this process? Please select the best response.					To what extend has the process or procedure been implemented? Please select the best response.					Select this box if use of this process is a high priority for your agency.	Select this box if you feel that a Peer Exchange on this topic would be useful.
	Never	Rarely (<5% Frequency)	Occasionally (<20% Frequency)	Often (<75% Frequency)	Routinely (>75% Frequency)	Initiation	Development	Execution	Assessment	Integration		
Establish project staffing qualifications - adequate experience, training, certification	○	○	○	○	○	○	○	○	○	○	○	○
Establish qualification requirements for Project Engineers, Resident Engineers, Construction Engineers	○	○	○	○	○	○	○	○	○	○	○	○
Establish qualification requirements for Construction Technicians	○	○	○	○	○	○	○	○	○	○	○	○
Establish qualifications for Contractors	○	○	○	○	○	○	○	○	○	○	○	○
Perform succession planning	○	○	○	○	○	○	○	○	○	○	○	○

Reset Matrix

1.3 Establish Privatization Practices

There is often a need to supplement DOT staff with consultants – a need which may require consultants to be on board quickly through the use of expedient contracting processes. In some cases the consultants may not be entirely familiar with the transportation construction projects and ensuring qualified consultants becomes a challenge. After hiring consultants, agencies must also administer the contract. There may be creative practices or processes to mitigate challenges such as delays in contracting in order to allow for a smooth transition to privatization of some roles and responsibilities. This may even include a plan within the DOT to determine the level of privatization in each of the disciplines to ensure that the DOT keeps a core competency of staff in house that can perform the work.

Establish Privatization Practices	How often does your agency use this process? Please select the best response.					To what extend has the process or procedure been implemented? Please select the best response.					Select this box if use of this process is a high priority for your agency.	Select this box if you feel that a Peer Exchange on this topic would be useful.
	Never	Rarely (<5% Frequency)	Occasion-ally (<20% Frequency)	Often (<75% Frequency)	Routinely (>75% Frequency)	Initiation	Develop-ment	Execution	Assess-ment	Integration		
Establish procedures to administer consultant work	○	○	○	○	○	○	○	○	○	○	○	○
Determine minimum expertise within the DOT as privatization occurs (in-house staff versus consultant staff ratio)	○	○	○	○	○	○	○	○	○	○	○	○
Establish procedures to get on-call consultants under contract quickly	○	○	○	○	○	○	○	○	○	○	○	○
Establish qualifications of consultants (training, mentoring, etc.)	○	○	○	○	○	○	○	○	○	○	○	○

Reset Matrix

Focus Area No. 1: Project Supervision and Staffing Supplemental Questions

(To gain additional information in this focus area, please provide your answers to each question below.)

Please tell us about any other exemplary practices or processes that your agency is currently implementing related to project supervision and staffing.

Please tell us about any other practices or processes in this focus area that your agency would like to improve and learn more about through a peer exchange.

Focus Area No. 2: Construction Safety

Construction safety management includes activities which determine polices, objectives, and responsibilities. These ensure a project is planned and executed in a manner that prevents or reduces accidents that could result in personal injury, fatalities, and/or property damage to those working on the site as well as those in the vicinity of the project. Safety of the workers and traveling public is the number one priority of the project staff.

For the Construction Safety focus area, the most important core elements include the agency safety culture, worker safety, and public safety. The purpose of this focus area is to identify creative practices and processes that have made improvements to traffic safety.

2.1 Agency Safety Culture

A safety culture exists within each DOT and the level of focus on safety is set by the leadership of the agency. The culture defines the resources available and used for safety purposes. There is an inherent cost with increasing the focus on safety and it takes commitment from the leadership within an organization to make it happen. However, there is an increased benefit of having a safety focus that can be quantified with appropriate performance measures.

Several examples of agency culture help define the core elements in this focus area. For example, the agency may create policies on cell phone use in vehicles, the use of personal protective equipment, and vehicle backing procedures to provide guidance on safe practices. Some DOTs have assigned Regional Safety Officers who work with the individuals and groups to emphasize best practices for safety. Guidance within some DOTs also includes assigning safety assessments as part of each employee's job description. Each employee is expected to spend time to assess the safety aspects of their job and make recommendations for improvement. Safety may also be tied to performance measures that provide the big-picture overview of how well the policies work. Construction safety data may be made visible at project sites and offices to further emphasize that safety must be a priority. The agency may also launch employee awareness campaigns and include incentives and/or disincentive programs.

Agency Safety Culture	How often does your agency use this process? Please select the best response.					To what extent has the process or procedure been implemented? Please select the best response.					Select this box if use of this process is a high priority for your agency.	Select this box if you feel that a Peer Exchange on this topic would be useful.
	Never	Rarely (<5% Frequency)	Occasion-ally (<20% Frequency)	Often (<75% Frequency)	Routinely (>75% Frequency)	Initiation	Develop-ment	Execution	Assess-ment	Integration		
Create safety policies	○	○	○	○	○	○	○	○	○	○	○	○
Create and staff a formal safety program	○	○	○	○	○	○	○	○	○	○	○	○
Track construction safety statistics	○	○	○	○	○	○	○	○	○	○	○	○
Create employee awareness programs with incentives and disincentives	○	○	○	○	○	○	○	○	○	○	○	○

Reset Matrix

2.2 Worker Safety

Care should be taken to minimize DOT and contractor staff accident risks on construction projects. These accidents can be caused by driver error, exposure to traffic, or exposure to the construction activities. Attention to Occupational Safety and Health Administration (OSHA) requirements or the creation of internal practices like a girder erection plan for structures puts focus on the importance of safety.

Specific safety training for construction activities may be required by DOTs. This has often been tied to the OSHA requirements and in some cases may be tied to a requirement for promotion. Tailgate meetings, on-site meetings, job hazard analysis, pre-activity meetings, and other training are regular activities that indicate a strong focus on worker safety. The toolbox or tailgate meetings that occur on a daily basis are designed to bring recurring daily focus on the importance of safety. Depending on the project size and complexity there may be a requirement for a contractor's safety officer on a project. There may be independent safety inspections by third parties. Worker fatigue is considered for projects that have accelerated schedules or night work. There are methods to minimize on-site work in both the design and construction phases. Use of technologies such as 3D modeling, off-site prefabrication, and stakeless construction through automated machine guidance can minimize exposure. Techniques and products may be used to help protect the workers. These products include intrusion alarms, positive protection devices, photo radar, and use of uniformed police for work zone safety.

Worker Safety	**How often does your agency use this process?** Please select the best response.					**To what extend has the process or procedure been implemented?** Please select the best response.					Select this box if use of this process is a high priority for your agency.	Select this box if you feel that a Peer Exchange on this topic would be useful.
	Never	Rarely (<5% Frequency)	Occasion-ally (<20% Frequency)	Often (<75% Frequency)	Routinely (>75% Frequency)	Initiation	Develop-ment	Execution	Assess-ment	Integration		
Require training for workers	○	○	○	○	○	○	○	○	○	○	○	○
Plan safety as part of the project (Hold pre-activity meetings, Conduct independent safety inspection (owner and/or contractor), Address worker fatigue, etc.)	○	○	○	○	○	○	○	○	○	○	○	○
Minimize on-site work (e.g. more prefabrication)	○	○	○	○	○	○	○	○	○	○	○	○
Implement innovative products	○	○	○	○	○	○	○	○	○	○	○	○

Reset Matrix

2.3 Public Safety

The safety of the traveling public through the work zone is very important. The traffic that flows through the work zone should be handled in a manner that protects motorists, pedestrians, motorcyclists, and workers. The method of handling traffic is designed with public safety in mind and includes strategies such as traffic control review inspections. Lane closure policies should be in place to best stage the project for the safety of the public. Performance measures can offer the big-picture overview of statewide performance related to injuries and fatalities in the work zone.

Some agencies perform statewide coordination of construction work zones. Identifying the traffic management limits often goes well beyond the project limits and needs to be given consideration. Traffic modeling using tools such as QuickZone and CA4PRS can help minimize impacts from construction.

Analysis of the planned flow versus the actual flow could be used to make adjustments if queue lengths become unacceptable. Pre-designed techniques that prompt contractors to make real-time adjustments for traffic flow may also be used. Programs to assess the overall safety with announced and unannounced traffic control reviews can be used to emphasize the importance of proper traffic control to all of the staff. Planning for incident management along with management of traffic during planned special events like concerts is proactive in addressing public safety. Collaboration with local emergency providers is also done proactively. There can also be better communication with the public regarding critical work zone information, including with the media, businesses, and community groups. For some large projects, a full-time safety team may be assigned.

Public Safety	How often does your agency use this process? Please select the best response.					To what extend has the process or procedure been implemented? Please select the best response.					Select this box if use of this process is a high priority for your agency.	Select this box if you feel that a Peer Exchange on this topic would be useful.
	Never	Rarely (<5% Frequency)	Occasion-ally (<20% Frequency)	Often (<75% Frequency)	Routinely (>75% Frequency)	Initiation	Develop-ment	Execution	Assess-ment	Integration		
Coordinate construction work zones statewide	○	○	○	○	○	○	○	○	○	○	○	○
Analyze planned vs. actual (flow, traffic limits, etc.)	○	○	○	○	○	○	○	○	○	○	○	○
Perform announced and unannounced traffic control reviews to assess overall safety	○	○	○	○	○	○	○	○	○	○	○	○
Communicate with stakeholders including the general public and emergency responders	○	○	○	○	○	○	○	○	○	○	○	○

Reset Matrix

Focus Area No. 2: Construction Safety Supplemental Questions

(To gain additional information in this focus area, please provide your answers to each question below.)

Please tell us about any other exemplary practices or processes that your agency is currently implementing related to Construction Safety.

Please tell us about any other practices or processes in this focus area that your agency would like to improve and learn more about through a peer exchange.

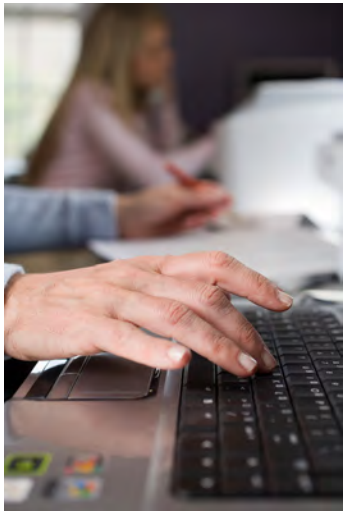
Focus Area No. 3: Construction Administration

Construction Administration involves all those actions necessary to successfully manage an awarded construction contract and assure the project is constructed in accordance with all contract provisions as well as State and Federal laws. It also ensures that all project actions are documented properly, and that the contractor and approved subcontractors are paid on a timely basis. It is important to ensure that the requirements of Federal funding are met and the project is successfully managed in the areas of schedule, quality, and cost.

The core elements within this focus area include project documentation and record keeping, project conflicts and claims, management of contract terms and changes, and management of environmental requirements. The purpose of this focus area is to identify creative practices and processes that can significantly improve construction administration.

3.1 Documentation and Record Keeping

Project documentation and record keeping includes many factors important for successful contract administration. They are needed for accurate and comprehensive control of the construction project. Documents are needed from the time of award to the start of construction. After the start of construction there are documents for the day-to-day events, payments, quantities, traffic control plans and other items. Quantities of work completed are documented for progress and final payment as well as prompt payment and retainage. Documentation also includes the project finals and the as-constructed plans. Many DOTs have implemented electronic project tracking and/or materials record systems to assist with documentation.



Some agencies are transitioning to the "digital jobsite" to automate record keeping. The use of electronics and automation for record keeping, project surveying, plan sets, and as-builts will be the basis for construction information management in the future. Some challenges may exist in capturing the important issues for disputes, keeping the original source documentation, and processing electronic submittals. Payment is another key process in this focus area. Challenges may exist in identifying whether the requirements have been met in a timely manner for prompt payment. Other issues include prompt payment requirements with contracts that require 100% completion for payment.

Documentation and Record Keeping	How often does your agency use this process? Please select the best response.					To what extent has the process or procedure been implemented? Please select the best response.					Select this box if use of this process is a high priority for your agency.	Select this box if you feel that a Peer Exchange on this topic would be useful.
	Never	Rarely (<5% Frequency)	Occasion-ally (<20% Frequency)	Often (<75% Frequency)	Routinely (>75% Frequency)	Initiation	Develop-ment	Execution	Assess-ment	Integration		
Implement the digital jobsite	○	○	○	○	○	○	○	○	○	○	○	○
Administer progress payments and final payments	○	○	○	○	○	○	○	○	○	○	○	○

Reset Matrix

3.2 Management of Contract Terms and Contract Changes

Each project will have a detailed project schedule and may use the critical path method (CPM) or other tool to track the progress of the tasks and time. Changes to the contract can result in changes to costs, schedule, and project termini. Approval processes need to be in place for such changes. There may also be formal processes in place to evaluate the changes and track them for the identification of trends. Value engineering change proposals (VECP) may be initiated by the contractor and may impact the time and/or cost of the project. The use of liquidated damages is also included as part of the process for management of contract terms.

The use of project schedules has complications including the need for training on and consistency of software between the owner and contractors. Scheduling can take on different complexities from a simple hard copy without the links between activities to 2D electronic schedules to the use of alternative construction schedules (3D, 4D, and 5D modeling). Schedules should be cost and resource loaded. There are advantages and disadvantages to each and project selection guidelines may be established to provide more of a formal process. Project staff must work with designers to ensure that changes will not adversely impact the overall project. This is especially critical with structural applications. Change orders impact the cost and time of the project. Adequate documentation of this information is required, but quick action to minimize the impact on the project is also important. Balancing these needs is critical. Guidelines for the use of liquidated damages include when they start and their application prior to the substantial completion date as well as during project closeout. VECP may be proposed during construction, and identification of best practices to overcome barriers may allow more successes and benefits. Contract administration also takes a new approach with the stewardship and oversight of Local Public Agency (LPA) projects. Some states have the staff to administer LPA projects while others may establish policies for oversight or stewardship of the program.

Management of Contract Terms and Contract Changes	How often does your agency use this process? Please select the best response.					To what extend has the process or procedure been implemented? Please select the best response.					Select this box if use of this process is a high priority for your agency.	Select this box if you feel that a Peer Exchange on this topic would be useful.
	Never	Rarely (<5% Frequency)	Occasion-ally (<20% Frequency)	Often (<75% Frequency)	Routinely (>75% Frequency)	Initiation	Develop-ment	Execution	Assess-ment	Integration		
Maintain resource loaded project schedules	○	○	○	○	○	○	○	○	○	○	○	○
Administer a formal process for change orders that considers impact on cost and schedule	○	○	○	○	○	○	○	○	○	○	○	○
Encourage Value Engineering change proposals	○	○	○	○	○	○	○	○	○	○	○	○
Provide oversight of LPA projects	○	○	○	○	○	○	○	○	○	○	○	○

Reset Matrix

3.3 Contract Conflicts and Claims

Disputes, conflicts and claims may arise throughout the construction project. The contract documents may be interpreted differently by the owner and the contractor. Processes are in place to minimize potential for these conflicts and resolving these conflicts quickly if they do arise. It is important that these processes are clearly defined with clear outcomes.

The use of partnering is intended to develop a relationship between the contractor and owner at the beginning of the project and establish methods for dispute resolution. Some agencies have had more success with this than others. The number of claims and the speed at which they are resolved is important for the individual projects and the overall construction program. The identification of false claims is also an important factor. Some states have adopted the use of dispute review boards to have claims settled by an independent third party.

Contract Conflicts and Claims	How often does your agency use this process? Please select the best response.					To what extend has the process or procedure been implemented? Please select the best response.					Select this box if use of this process is a high priority for your agency.	Select this box if you feel that a Peer Exchange on this topic would be useful.
	Never	Rarely (<5% Frequency)	Occasion-ally (<20% Frequency)	Often (<75% Frequency)	Routinely (>75% Frequency)	Initiation	Develop-ment	Execution	Assess-ment	Integration		
Use innovative methods to resolve contract claims and disputes	○	○	○	○	○	○	○	○	○	○	○	○
Use a formal partnering process to establish methods for dispute resolution	○	○	○	○	○	○	○	○	○	○	○	○

Reset Matrix

3.4 Environmental Responsibility

During the administration of the contract there is a greater awareness and focus on environmental responsibility. Topics of concern that impact construction administration include erosion control, water pollution, hazardous materials, clean air and fugitive dust, and the use of recycled materials.

There is a need to be more proactive in this area than reactive. In many cases, violations occur and increase (after the fact) involvement in projects by environmental agencies, both at the Federal and State levels. Partnering with these regulatory agencies to ensure cost-effective compliance has been effective. This can be accomplished programmatically or on a project-specific basis. For larger and more environmentally sensitive projects, these meetings continue throughout construction at regular intervals. It is important that implementation of a project stays within the environmentally cleared footprint and that stakeholders understand the limits of the footprint. Clear, consistent, and repeatable processes need to be outlined so that contractors can effectively bid the project and Project Engineers can effectively administer the contract. During construction, an independent environmental manager may provide observations to the Project Engineer. There have been increased levels of monitoring of noise and air quality during construction with reports provided to contractors to meet specified standards. There are innovative statewide solutions for environmental items such as water quality and hazardous material disposal that provide opportunities for efficiencies and may occur on a project-by-project basis.

Environmental Responsibility	How often does your agency use this process? Please select the best response.					To what extend has the process or procedure been implemented? Please select the best response.					Select this box if use of this process is a high priority for your agency.	Select this box if you feel that a Peer Exchange on this topic would be useful.
	Never	Rarely (<5% Frequency)	Occasion-ally (<20% Frequency)	Often (<75% Frequency)	Routinely (>75% Frequency)	Initiation	Develop-ment	Execution	Assess-ment	Integration		
Partner with regulatory agencies	○	○	○	○	○	○	○	○	○	○	○	○
Ensure that environmental commitments (water, air and noise) are met	○	○	○	○	○	○	○	○	○	○	○	○

Reset Matrix

Focus Area No. 3: Construction Administration Supplemental Questions

(To gain additional information in this focus area, please provide your answers to each question below.)

Please tell us about any other exemplary practices or processes that your agency is currently implementing related to Construction Administration.

Please tell us about any other practices or processes in this focus area that your agency would like to improve and learn more about through a peer exchange.

Focus Area No. 4: Construction Quality

Quality for construction projects is defined as conformance to or exceeding the standards and requirements as outlined by the customer. Quality management processes include all the activities of the performing organization that determine quality policies, objectives, and responsibilities so that the project meets the requirements as intended. This can mean the same thing as completing the project in conformance with all of the original requirements.

For the Construction Quality focus area, the most important core elements include performance measures and metrics, quality assurance, and inspection and workmanship. The purpose of this focus area is to identify creative practices and processes that have made improvements to construction quality.

4.1 Performance Measures and Metrics

Use of performance measures and metrics is on the rise. Capturing the big-picture overview of a construction program in terms of cost and schedule performance is important information for DOT leadership, state legislature, and participating agencies such as FHWA. Understanding program costs, percent change of finalized contract (contract growth), and projects completed on time are important to understand for leadership to have confidence in the construction program.

It is important to identify goals and objectives such that measurement of construction project performance is done for the right reasons. In order to add value, performance measures must result in some revisions to policies and procedures, as appropriate. Mechanisms need to be in place to ensure that projects are completed on time and within budget. There is also a balance of cost, schedule, and quality. The balanced scorecard must take into account the inter-relationship of these three factors. Although cost and time are relatively easy to quantify, the quality is more difficult. There are many details associated with calculating metrics such as handling the cost and time associated with change orders, handling contract times, etc. These assumptions need to be documented for consistency. The application of performance measures to LPA projects should also be included in the process.

Performance Measures and Metrics	How often does your agency use this process? Please select the best response.					To what extent has the process or procedure been implemented? Please select the best response.					Select this box if use of this process is a high priority for your agency.	Select this box if you feel that a Peer Exchange on this topic would be useful.
	Never	Rarely (<5% Frequency)	Occasionally (<20% Frequency)	Often (<75% Frequency)	Routinely (>75% Frequency)	Initiation	Development	Execution	Assessment	Integration		
Develop and track meaningful performance measures	○	○	○	○	○	○	○	○	○	○	○	○

Reset Matrix

4.2 Quality Assurance

Every DOT has a quality assurance (QA) program. This is an all encompassing concept that includes six main principles: quality control, acceptance, independent assurance, dispute resolution, laboratory accreditation and qualifications, and personnel qualifications. Although these principles are most commonly and formally applied to materials, they also have a role in design and construction. The contractor's quality control program includes application to plans and other submittals, reports, and records. These are provided at pre-paving, pre-construction, and pre-deck pour meetings and used by the contractor to verify the QC activities. This is a great opportunity to be proactive. The owner will have an acceptance program and it may utilize some of the contractor's QC program. There are lab qualification programs and personnel certification programs.

Contractors have requirements for QC plans for production, lay down, etc. The plans should have an approval process and then consequences for not following them. Some DOTs make sure that they are followed such that the plans don't just end up in a file to fulfill a requirement. The DOT's acceptance program may utilize the contractor's test results in decision making processes. This requires validation of the contractor's results. There are also dispute resolution procedures for test results. The Independent Assurance System can be system based or project based. Regulations are in place that require materials testers be certified, but some DOTs have also included inspector qualification programs as well.

Quality Assurance	How often does your agency use this process? Please select the best response.					To what extend has the process or procedure been implemented? Please select the best response.					Select this box if use of this process is a high priority for your agency.	Select this box if you feel that a Peer Exchange on this topic would be useful.
	Never	Rarely (<5% Frequency)	Occasion-ally (<20% Frequency)	Often (<75% Frequency)	Routinely (>75% Frequency)	Initiation	Develop-ment	Execution	Assess-ment	Integration		
Establish agency's quality assurance program	○	○	○	○	○	○	○	○	○	○	○	○
Utilize contractor's QC most effectively	○	○	○	○	○	○	○	○	○	○	○	○
Effectively communicate QC and acceptance data between DOT and contractor	○	○	○	○	○	○	○	○	○	○	○	○

Reset Matrix

4.3 Inspection and Workmanship

The DOT performs inspection to ensure the contractor's workmanship is acceptable. Steps are outlined for the best workmanship practices and inspectors measure the workmanship. The level of inspection is often tied to the risks associated with the item being inspected (such as potential impact to safety, cost, and/or schedule).

Most DOTs have formal inspection checklists that identify the item to be inspected and the steps the inspector should document. Some states have used a risk-based process and re-evaluated what should be inspected and the appropriate frequency. These updated checklists allow more efficient use of the inspectors. There are several innovative practices for inspection. In some cases a roving "bridge deck team" travels to the project site to ensure the consistent quality of this item. In some cases inspectors are provided with new tools such as thermal imaging and ground penetrating radar to make their inspection more efficient and accurate.

Inspection and Workmanship	How often does your agency use this process? Please select the best response.					To what extend has the process or procedure been implemented? Please select the best response.					Select this box if use of this process is a high priority for your agency.	Select this box if you feel that a Peer Exchange on this topic would be useful.
	Never	Rarely (<5% Frequency)	Occasion-ally (<20% Frequency)	Often (<75% Frequency)	Routinely (>75% Frequency)	Initiation	Develop-ment	Execution	Assess-ment	Integration		
Assess inspection levels of effort with risk-based processes	○	○	○	○	○	○	○	○	○	○	○	○
Implement innovative practices and tools for inspection	○	○	○	○	○	○	○	○	○	○	○	○

Reset Matrix

Focus Area No. 4: Construction Quality Supplemental Questions

(To gain additional information in this focus area, please provide your answers to each question below.)

Please tell us about any other exemplary practices or processes that your agency is currently implementing related to Construction Quality.

Please tell us about any other practices or processes in this focus area that your agency would like to improve and learn more about through a peer exchange.

Focus Area No. 5: Innovation

Innovation includes a range of new technologies, techniques, and methods designed to change the way decisions are made and how values are reflected in construction efforts. The use of contracting practices beyond design-bid-build is increasing. With the growth of technology there are more examples of innovative equipment, products and practices available.

For the Innovation focus area, the most important core elements include alternative contracting; innovative practices, processes, products and equipment; and recognition. The purpose of this focus area is to identify creative practices and processes that allow for innovation.

5.1 Alternative Contracting

The traditional design-bid-build projects are frequently used. However, alternative contracting tools are available and becoming more widely used. Depending on the project, the selection of an alternative contracting method can provide for a more efficient delivery of the project.

Numerous examples of alternative contracting exist such as design-build, cost plus time bidding, fixed price variable design, Construction Manager/General Contractor (CMGC), job order contracting, qualification-based short listing, batching routine bridges, public-private partnerships (PPP), and alternate bidding.

Some agencies have project selection guidelines so each project can be evaluated on a case-by-case basis to determine the most efficient type of alternative contracting for the project. Some states have created a risk assessment approach for selection of the most appropriate type of contracting for the project. Further, prior to advertisement of the project, some states conduct a risk assessment to ensure there were no oversights. When a project is only designed to a level of 30% at the time of advertisement, it is important to ensure that the critical information is included.

Alternative Contracting	How often does your agency use this process? Please select the best response.					To what extent has the process or procedure been implemented? Please select the best response.					Select this box if use of this process is a high priority for your agency.	Select this box if you feel that a Peer Exchange on this topic would be useful.
	Never	Rarely (<5% Frequency)	Occasionally (<20% Frequency)	Often (<75% Frequency)	Routinely (>75% Frequency)	Initiation	Development	Execution	Assessment	Integration		
Create a comprehensive innovative contracting process (to guide in the selection of the right contracting mechanism for projects)	○	○	○	○	○	○	○	○	○	○	○	○
Assess the risk of using a particular contracting mechanism for a given project and then assess the risk prior to advertisement	○	○	○	○	○	○	○	○	○	○	○	○

Reset Matrix

5.2 Innovative Practices and Products

Technology is constantly changing and increases opportunities to improve the way things are done. New practices or ways of doing things and new products are allowing the opportunity for increased efficiency. Innovative practices and products can be used to help improve construction delivery.

As a practical example, some agencies have compiled a summary of value engineering change proposals. Also, the lessons learned gathered from post-construction reviews provide ideas for innovation. On the technology side, new equipment and products are implemented such as real-time smoothness, field spectroscopy devices, infrared and ground-penetrating radar for uniform thickness measurements, intelligent compaction, and automated machine guidance. Prefabricated Bridges and other accelerated construction approaches are being used. Civil Integrated Management (CIM) is gaining usage for helping design and construction staff coordinate projects.

Innovative Practices and Products	How often does your agency use this process? Please select the best response.					To what extend has the process or procedure been implemented? Please select the best response.					Select this box if use of this process is a high priority for your agency.	Select this box if you feel that a Peer Exchange on this topic would be useful.
	Never	Rarely (<5% Frequency)	Occasion-ally (<20% Frequency)	Often (<75% Frequency)	Routinely (>75% Frequency)	Initiation	Develop-ment	Execution	Assess-ment	Integration		
Implement innovative practices and products	○	○	○	○	○	○	○	○	○	○	○	○

Reset Matrix

5.3 Innovative Construction Methods

Contractors are becoming more sophisticated. Additionally, as state DOTs and FHWA offices lose staff to budget cuts and retirements, the DOTs and FHWA are becoming increasingly more involved in managing the work rather than setting policy and providing leadership. For certain projects, the most efficient construction methods are often based on contractor innovations.

Innovative Construction Methods	How often does your agency use this process? Please select the best response.					To what extend has the process or procedure been implemented? Please select the best response.					Select this box if use of this process is a high priority for your agency.	Select this box if you feel that a Peer Exchange on this topic would be useful.
	Never	Rarely (<5% Frequency)	Occasion-ally (<20% Frequency)	Often (<75% Frequency)	Routinely (>75% Frequency)	Initiation	Develop-ment	Execution	Assess-ment	Integration		
Allow contractors to develop and/or utilize innovative construction methods	○	○	○	○	○	○	○	○	○	○	○	○

Reset Matrix

5.4 Recognition

When testing innovations, they do not always work the first time. A culture needs to be created to foster creativity and accept failures as part of the path of learning, not as a means that could potentially stifle creativity. A process exists where innovation is encouraged. When innovations are successful, they can be acknowledged and celebrated.

Awards are often given. Industry events highlight innovated practices. Reports are prepared and presented within the state and nationally to share success stories. National groups often recognize state DOT accomplishments through means such as quality awards.

Recognition	How often does your agency use this process? Please select the best response.					To what extend has the process or procedure been implemented? Please select the best response.					Select this box if use of this process is a high priority for your agency.	Select this box if you feel that a Peer Exchange on this topic would be useful.
	Never	Rarely (<5% Frequency)	Occasion-ally (<20% Frequency)	Often (<75% Frequency)	Routinely (>75% Frequency)	Initiation	Develop-ment	Execution	Assess-ment	Integration		
Create a culture of recognition that fosters innovation	○	○	○	○	○	○	○	○	○	○	○	○

Reset Matrix

Focus Area No. 5: Innovation Supplemental Questions

(To gain additional information in this focus area, please provide your answers to each question below.)

Please tell us about any other exemplary practices or processes that your agency is currently implementing related to Innovation.

Please tell us about any other practices or processes in this focus area that your agency would like to improve and learn more about through a peer exchange.

Focus Area No. 6: Communications/Data/Information Sharing

Communication of the various transportation messages for projects can be one key to their success. The messages sent to the travelling public before and during construction impact their perception of the project. Also, communications during the environmental efforts, such as NEPA, can impact the flexibility that exists for the construction of the project. Communication between construction and all of the internal and external stakeholders allows relationships to be fostered that will enhance current projects and allow for the implementation of lessons learned for the benefit of future projects. Communication takes many forms and occurs across many stakeholder groups, and may include data and information about the project before construction, during construction, and after project completion. Internal stakeholder groups include those in design, structures, environmental, and maintenance. External stakeholders include FHWA, the general public, contractors, and consultants.

For this focus area, the most important core elements include public relations, the NEPA process, and internal and external feedback between construction staff and others. The purpose of this focus area is to identify creative practices and processes to that have made improvements in communications.

6.1 Public Relations

The traveling public is the end user of the construction project. Keeping them informed of the upcoming project and changes throughout the project is important.

A greater emphasis is being given to marketing the project to the end users. More often there are proactive media campaigns to deliver transportation's message to the public and raise awareness of transportations importance to the quality of life. Support of elected officials is also an effective strategy. A variety of methods exist to communicate information. These include radio, television, social media, internet, marketing (e.g. Carmageddon), and real-time traffic information.

Public Relations	How often does your agency use this process? Please select the best response.					To what extent has the process or procedure been implemented? Please select the best response.					Select this box if use of this process is a high priority for your agency.	Select this box if you feel that a Peer Exchange on this topic would be useful.
	Never	Rarely (<5% Frequency)	Occasionally (<20% Frequency)	Often (<75% Frequency)	Routinely (>75% Frequency)	Initiation	Development	Execution	Assessment	Integration		
Create an effective public relations program to mitigate public impact	○	○	○	○	○	○	○	○	○	○	○	○

Reset Matrix

6.2 NEPA Process

During the NEPA process, expectations are established for the construction of the project. Environmental commitments are made that need to be part of the construction process and final transportation facility. Documenting these commitments will help ensure that they are carried through in design and construction. It is important that these expectations are general enough to meet the environmental needs and yet allow innovation in the construction methods.

NEPA Process	How often does your agency use this process? Please select the best response.					To what extend has the process or procedure been implemented? Please select the best response.					Select this box if use of this process is a high priority for your agency.	Select this box if you feel that a Peer Exchange on this topic would be useful.
	Never	Rarely (<5% Frequency)	Occasion-ally (<20% Frequency)	Often (<75% Frequency)	Routinely (>75% Frequency)	Initiation	Develop-ment	Execution	Assess-ment	Integration		
Ensure environmental commitments in the NEPA document are satisfied	○	○	○	○	○	○	○	○	○	○	○	○
Communicate the needs of construction during the NEPA process to ensure innovative construction methods will be viable	○	○	○	○	○	○	○	○	○	○	○	○

Reset Matrix

6.3 Types of Feedback Used to Share Data and Communicate Issues

Communication between construction and all of the internal and external stakeholders allows relationships to be fostered for the benefit of the overall program and projects. In some cases the design and construction coordination is done well with much communication. Meetings between the design and construction staff can clarify the intent of the design. In other cases it may be difficult for the designers to visit the project site during the design. Early constructability reviews involving key participants has been shown to improve the plans.

Pre-bid or post-bid meetings with the designer, consultant and contractor may be held to develop a shared vision of the project. Designing and building the project with maintenance in mind is important. Developing and maintaining relationships with the contractor is important to build trust and respect. This goes beyond email communication. There is a need to have a collaborative team to handle issues and brainstorm solutions. The contractor and owner have a shared commitment to quality. After the project, post-construction reviews can document lessons learned and implement them for the benefit of future projects.

Types of Feedback Used to Share Data and Communicate Issues	How often does your agency use this process? Please select the best response.					To what extend has the process or procedure been implemented? Please select the best response.					Select this box if use of this process is a high priority for your agency.	Select this box if you feel that a Peer Exchange on this topic would be useful.
	Never	Rarely (<5% Frequency)	Occasion-ally (<20% Frequency)	Often (<75% Frequency)	Routinely (>75% Frequency)	Initiation	Develop-ment	Execution	Assess-ment	Integration		
Communication and data/information sharing between construction staff and internal stakeholders from design, through construction, to maintenance for current project and the implementation of lessons learned	○	○	○	○	○	○	○	○	○	○	○	○
Foster relationships and trust with the contractor	○	○	○	○	○	○	○	○	○	○	○	○
Conduct post-construction reviews and implement lessons learned	○	○	○	○	○	○	○	○	○	○	○	○

Reset Matrix

Focus Area No. 6: Communications/Data/Information Sharing Supplemental Questions

(To gain additional information in this focus area, please provide your answers to each question below.)

Please tell us about any other exemplary practices or processes that your agency is currently implementing related to Communications/Data/Information Sharing.

Please tell us about any other practices or processes in this focus area that your agency would like to improve and learn more about through a peer exchange.

Please suggest any specific opportunities to streamline, integrate or automate processes for the benefit of construction delivery [e.g. concurrent activities, eliminate non-essential activities/requirements, coordination with environment/design/operations, project management software/systems].

Submit

Finished? When complete, click "Submit" to email your responses to FHWA automatically. Be sure to "save as" and include your state in the file name prior to submitting.