



Construction Peer Network Southwest Peer Exchange

Summary Report

November 14-15, 2012

Salt Lake City, Utah



Hosted by the Utah Department of Transportation

1 Background

The Utah Department of Transportation (UDOT) hosted the Construction Peer Network (CPN) Southwest Peer Exchange in Salt Lake City, Utah on November 14-15, 2012. The CPN's purpose is to widely deploy proven, effective construction practices that will benefit the U.S. transportation system and the American people.

The CPN is a collaboration of the American Association of State Highway and Transportation Officials (AASHTO), the American Road and Transportation Builders Association (ARTBA), the Associated General Contractors of America (AGC), and the Federal Highway Administration (FHWA). The Peer Exchange was the third in a series of five regional events aimed to showcase innovation in construction, allow peers to network and share information, and generate ideas for implementation of proven practices and processes.

Construction leaders from the States of Arizona, California, Colorado, Hawaii, Nevada, New Mexico, Oklahoma, Texas, and Utah attended the peer exchange. A representative from the Florida Department of Transportation (FDOT) participated to help FDOT prepare as host to the fourth Peer Exchange scheduled for March 2013. State agency representatives and FHWA Division Office representatives from each State participated in the Peer Exchange. Representatives from the Central Federal Lands Highway Division also participated in the event. The list of attendees, along with contact information for each, is provided as an appendix to this document.

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Exchange topics for the Peer Exchange agenda were determined after analyzing State DOT survey responses from the CPN's Program Information Tool (PI Tool). Based on analysis of the PI Tool results, lead states were identified and asked to present their successful practices as a way to introduce the topic and initiate the roundtable discussions. The five exchange topics are listed below in Table 1. The User's Guide for the Program Information Tool describes in greater detail the approach for gathering exemplary construction practices from the states and this document, along with a flyer describing the program, can be accessed at:

<http://construction.transportation.org/Pages/ConstructionPeerNetworking.aspx>.

Table 1. Peer Exchange Agenda Topics

Agenda Topic	Construction 'Core Element' Category	Number of States selecting as Peer Exchange Topic	Lead State
1. Determining Staffing Levels on a Project	Determining Staffing Levels (methods to ensure enough staff)	5	Texas
2. Establishing Qualifications for Contractors	Establish Qualifications of Staff, Consultants, and Contractors	5	Florida
3. Assessing Inspection Levels of Effort with Risk Based Processes	Innovative Inspection Practices	5	Arizona
4. Developing and Tracking Meaningful Performance Measures	Performance Measurement	5	Caltrans
5. Implementing the Digital Jobsite	Documentation and Record Keeping	3 (selected as high priority by six states)	Utah

In addition to these lead state presentations, UDOT made a host state presentation to highlight noteworthy practices, and Caltrans facilitated an open session for 'Other Regional Priorities' which covered topics on work zone safety and performance based specifications.

The following section highlights findings and summarizes the Peer Exchange discussions for the host state presentation, the five exchange topics and the "Other Regional Priorities."

2 Ideas for Implementation – Key Takeaways from the Peer Exchange

The Peer Exchange produced several relevant and practical “takeaways” identified by the group roundtable discussions. The following sections address the 16 items that were highlighted by the group as practices that hold promise for future implementation within the States’ construction programs. Web site links are provided for some of the practices currently in use by Southwest States. Documents referenced are also available from those individual States, although not available online. Use the State references along with contact information included in the appendix to gather more information for implementation.

Agenda Topic: Host Agency Presentation – Utah DOT

UDOT presented two mega-projects that are nearing completion. The I-15 project was constructed using a design-build contract, while the Mountain View Corridor (MVC) project used the Construction Manager/General Contractor (CM/GC) method for project delivery. UDOT discussed the reasons each method was used. A notable characteristic of the projects was the use of partnering — having great trust among all parties and working as a team with a common goal — which generated the communication necessary to deliver these successful projects. Other exemplary practices included:

- Project staff completed risk analyses along with the contractors. Risk registers were then used to eliminate or mitigate risks where possible and assign remaining risks to the party best able to handle them.
- UDOT used ProjectWise and SharePoint web-based software applications to facilitate project communications, approvals and contracts administration.
- UDOT used a fixed budget, variable scope approach in the design-build contracting to encourage maximum innovation and value. They were rewarded with additional miles and interchanges beyond the base scope expected by UDOT’s original budget estimates.

Agenda Topic #1: Determining Staffing Levels on a Project

1. Utilizing Maintenance Personnel for Construction Inspection

UDOT 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. Combining the two functions has required some changes in civil service classifications (for example, TXDOT classifies everyone “general engineering staff,” so they no longer have 2 types of employees). This allows staff to go from construction to maintenance and back without a title change; however, the DOTs that do this gain efficiency in personnel utilization by using the right people at the right time. Gaining acceptance from both workgroups can be a problem, but there are benefits to both functions in terms of career paths, and pay and job satisfaction. Several DOTs present thought this would be a positive approach and will consider pursuing implementation.

2. Training Needs when Construction and Maintenance Workforces are Combined

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 benefit 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.

3. Using a Statewide Program for Total Staffing Needs

Almost all DOTs are expected to do more with less. Top management may require continuous cuts in the numbers of construction inspection personnel available. TXDOT 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 for temporary sharing of personnel.

An example of how one DOT addresses staffing is the Florida Staffing Needs Assessment Tool: <http://www.dot.state.fl.us/Construction/DesignBuild/ConsultantCEI/ConsultantMain.shtm>

Agenda Topic #2: Establishing Qualifications for Contractors

4. Prequalification has Value for Contractors and DOTs

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 two million dollars, between two and 20 million dollars, between 20 and 50 million dollars, or an unlimited dollar amount. The contractors present were not necessarily evaluating the potential for a level playing field, but want the process to be objective.

In addition to the dollar amount a contractor has on the books, DOTs may limit the type of work a contractor can bid on (e.g., grading, bridges, asphalt or concrete paving, etc.). If a contractor is not prequalified to perform work types in a given proposal, they would have to be a subcontractor to another prime contractor or use subcontractors to perform the types of work for which they are not prequalified.

DOTs thought that implementing example practices for contractor quality rating techniques could add considerable value.

Florida DOT Prequalification Information:

<http://www.dot.state.fl.us/procurement/prequalification.shtm>

<http://www.dot.state.fl.us/procurement/pubs/Rule%2014-75new.pdf>

Florida DOT Contractor Rating System:

<http://www.dot.state.fl.us/construction/Manuals/cpam/New%20Clean%20Chapters/Chapter13s1.pdf>

Also see UDOT Contractor Rating Flowchart and Guidelines

5. Contractor Rating of Resident Engineers

While most DOTs do prequalify contractors, which may involve ratings from field personnel, there are some DOTs where the contractor rates the resident engineer. Utah is in the process of developing a rating system. Though still under development, there was considerable interest by the DOTs present on this subject. Many DOTs believe this is a good option and want to investigate it further.

Florida DOT Contractor Rating System for FDOT Personnel:

<http://www.dot.state.fl.us/construction/Manuals/cpam/New%20Clean%20Chapters/Chapter13s3.pdf>

Also see Utah DOT Draft Resident Engineer Rating and Flowchart

6. Need for Project Closeouts

Contractors present thought there was a need to have a closeout phase on each project covering how everyone worked together, the quality of the work, and noting potential changes for future work. Closeout should cover the results of checklist deficiencies, safety issues, etc. The general consensus was that this should be done at the project level and not be directed by DOT headquarters, even though the information could be forwarded and used in prequalification. DOTs also want to expedite contract closeout so that projects get off the books and leftover funds are freed up.

Also see 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

Agenda Topic #3: Assessing Inspection Levels of Effort with Risk-Based Processes

7. Using Checklists to Improve Construction Inspection

The Arizona DOT made a presentation on the “Quantlist” (checklist) tool they use to guide inspection. The list is developed for appropriate bid items and their attributes, including requirements covered in the specifications that should be inspected.

Each attribute in the checklist is given a weighting factor based on importance and risk to project quality. This does not imply items on the checklist do not need to be inspected, although some less critical items may not be inspected if deemed acceptable by the assigned DOT decision-makers. Each item has a “yes” or “no” box to check as to being within the specifications or acceptable. Once the checklist is completed, the system computes an overall value for the items in order to rank those with the most potential for impact to project schedule, cost, and safety. Each checklist is a snapshot in time that records compliance and noncompliance.

Arizona reported that the checklist used by DOT inspectors helps generate uniformity within the DOT. Checklists for various bid items were developed by experts in the various items. The results can be split in many ways and used to analyze a contractor’s adherence to quality. There are checks and balances within the system to ensure consistency in judging a contractor’s work.

Many of the DOTs present have a check list to help with inspection. The Arizona “Quantlist” is the most detailed and has been computerized. One of the keys to the “Quantlist” is the references to the specifications or other requirements such as the MUTCD, plans, manufacturer recommendations, etc. See some individual DOTs benefits using checklists in Takeaway #8 below.

TXDOT also uses mentors to help new inspectors determine critical items for inspection.

Arizona DOT FAQs and link to Quantlist software:

http://www.azdot.gov/Highways/ConstGrp/Value_Quality/FAQ_Quantlist.asp

8. Use of Checklists

The question was asked as to how many DOTs were using check lists. From the discussions, it appeared most of the participating DOTs were using them in some form. The contractors present expressed interest in having a checklist to better understand expectations and to proactively check their operations. Specific responses were:

- FL — Used on critical requirements
- NM — Developing a construction guide that includes checklists
- NV — Used for work zones
- TX — Developed program modules for specification book items and uses mentors to help new inspectors see what is most important
- UT & NV — Uses manuals rather than checklists
- Contractors — Some specific jobs have checklists
- Contractor — Continually training on use of checklists; some difference in use, given that what they do is more repetitive than what the DOT does

9. Joint Development of Checklists

There was a general consensus that joint development of checklists by both the DOT and contractors would be valuable, especially as more and more quality issues are shifted to the contractor. A joint development team could be started between the contractors associations and the DOT. This issue was noted as another possible area for improved communications and partnering.

Florida DOT Construction Guidelists and Critical Requirements Lists:

<http://www.dot.state.fl.us/construction/CONSTADM/Guidelist/GuideIndex.shtm>

10. Greater Information Sharing between DOT and Contractor Utilizing Electronic Methods

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 those present was that an effort to share information would be beneficial to the completion of a quality project. As noted above, one example might be to have contractors obtain copies of the DOT checklists. Developing approaches for sharing appropriate information between DOT and contractor would be a good follow-up action.

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. As a role in partnering, agencies are encouraged to share information among the project stakeholders including any electronic or digital data available.

Nevada Contractor Information Website:

http://www.nevadadot.com/Doing_Business/Contractors/Contractor_Information.aspx

11. Reduce Risk by Using Web-based Videos to Train Inspection Forces

UDOT is using video presentations to help train its inspection staff. These videos could be viewed before the inspector goes to the field. For new inspectors, the video gives an idea of what to look for and why, while for experienced inspectors it can provide a quick review. The use of videos was seen as an excellent way to train staff on new and improved methods and products that are developed. With overall reduced numbers of inspectors, training becomes a major point of emphasis. The younger generation of inspectors is more accustomed to electronic training compared with senior staff thus acceptance of the video training method should be smooth.

Caltrans Computer Based Training Resources: <http://www.dot.ca.gov/hq/construc/training/>

Utah Inspector Guide and Training Videos:

<http://www.udot.utah.gov/main/f?p=100:pg:0:::1:T,V:1572,65102>

Agenda Topic #4: Developing and Tracking Meaningful Performance Measures

12. Best Performance Measures (PMs) in Use at Individual DOTs

All DOTs present have PMs, and the participants wanted to know what each DOT thought was its best. Rather than ask each during the peer exchange, it was decided all would report at a

later time the PMs they thought had the most important information, along with contact information so others could obtain additional information.

Florida DOT Performance Measures Reports:

<http://www.dot.state.fl.us/construction/CONSTADM/reports/perfmeasNEW/PerformanceMain.shtm>

<http://www.dot.state.fl.us/construction/CONSTADM/reports/cost&timeNEW/ConstructionOfficeReport.shtm>

Caltrans Construction Performance Measures: <http://www.dot.ca.gov/hq/construc/training/>

Also see Colorado DOT Transportation Performance Measures Spreadsheet

Also see Utah DOT Executive Dashboard on Performance Measures

Agenda Topic #5: Implementing the Digital Jobsite

13. Working in the Electronic Age

DOTs and contractors are working to better utilize digital tools, data and systems to help them do more with fewer resources. Managing construction requirements for inspection, testing, and documentation are among the activities which are being accomplished using computer and web-based applications and tools. All of the DOTs present have begun the complex change to what has been termed 'the digital jobsite' and are at varying stages of deployment.

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 works in progress. Some common practices which seem successful include:

- Current or planned use of ProjectWise and SharePoint for documentation, approvals and real-time, web-based communications (UDOT, 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 UDOT).

14. Need for Digital System Champions

During discussion, it was emphasized that little would get done without having someone in the agency become the champion for the individual digital system being developed. This is true for many changes, but especially in the today's evolving digital age. Without a champion, many changes simply fade out. It was also noted that systems often fail because no one wants to maintain digital systems. Many involved with digital systems want to develop or build them, but do not want to continually maintain them.

15. Paper to a Digital (Electronic) Work Site

There were no DOTs reporting 100 percent of their work completed electronically, though it seemed all were targeting that as the ultimate goal. There are many obstacles to address before this can become a reality, including legal issues. Recording field information is easier to implement than creating the ability to sign a contract or issue a change order electronically.

The discussion included electronic plans and the digital information used by DOTs in plan development, which contractors could use but are generally not given. During plan development, the DOT information often goes from 2D to 3D then to 2D for bidding, and when the contractor gets the plans it converts the design back to 3D. Every time the information is changed there is a risk it can become compromised. These are issues each DOT must address and most attendees believed that with proper disclaimers the information could be shared.

See Nevada DOT EBidding Training PowerPoint file

16. Automated Machine Control

Along with the 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. Central Federal Lands has considerable experience with electronically controlled machines, including specifications.

See Caltrans Draft Guidelines for Implementing Automated Machine Guidance

Other Regional Priorities Discussion

During the “Other Regional Priorities” session, the facilitator asked what topics the participants wanted to discuss, after which the list was prioritized.

Number one was Work Zone (WZ) safety. Recent fatality accidents involving Caltrans employees were back ground to this topic. The roundtable included discussion of both DOT and contractor accidents as well as accidents caused by users entering the WZ. Much of the discussion centered on the following topics and changes being implemented by DOTs - many of which could be adopted by others:

- AZ — Allow blue and red lights on rear of vehicles
- Caltrans — Measure number and causes of WZ crashes
- Caltrans — Relate crashes to the quality of contractor (awareness)
- Caltrans — Use more WZ barriers
- CO — Owner-controlled insurance now involving contractors insurance
- CO — Track accidents involving workers or drivers on cell phone
- CO — Add reflective tape on rear of vehicles
- CO — Use spotter before WZ who may alert crew

- CO — Highway patrol doing more drunk-driver checks
- FL — Show WZ speed on a message board
- FL — Traffic control deficiencies added to items in prequalification
- NM — Pay for off-duty police officers
- NM — Run a safety advertisement campaign
- UT — Established joint committee with DOT, industry, and highway patrol to see what could be changed to improve safety
- UT — Add flashing lights on equipment
- UT — Limit cell phone use by employees
- Contractor — Make traffic control very clear in the specifications; if more is needed, will increase cost
- Contractor — Use more highway patrol help
- Contractor — Wants DOT to be rougher on inspection of traffic control (proper signage)

Florida DOT Design Standard for Motorist Awareness System:

<http://www.dot.state.fl.us/rddesign/DS/13/IDx/00670.pdf>

The second topic in the open session centered on the DOTs' change from method-based to performance based specifications. The general takeaway was most DOTs want to move toward performance-based specifications and shift additional testing responsibilities to the contractor. There was an intermixing of quality control and quality assurance issues in the discussion. Thoughts on the move towards performance-based specification included the following:

- HI — Having some issues as to how to measure quality
- HI — QC is being looked at
- HI — Interested in comparing destructive testing results with nondestructive testing
- FL — Wants to move toward performance-based specs, but noted that acceptance is hard to get, though the design-build movement has helped the situation
- TX — Very much in favor and is becoming aggressive in the change
- UT — Moving to having more QC done by the contractor
- UT — When doing design-build, some reluctance to let QC shift to the contractor
- Contractor — Would like clearer, more concise specifications as well as knowing what expectations DOT has.

See Central Federal Lands Highway Division Specification Documents

See Tech Brief Document for QA for Design-Build

3 Appendix A – Peer Exchange Discussion Notes

This section provides additional notes following the organization of the agenda. The full agenda for the Peer Exchange is included as an appendix to this document, along with a roster of participants with contact information for each participant. This report is designed to facilitate additional networking and discussion on the topics summarized from the event.

After Utah’s Host Agency Presentation, each presentation discussion session covered the questions below and the following notes are structured similarly.

- What other innovative practices (related to this topic) have you used?
- What are some of the challenges associated with expanding use?
- What actions can be taken to further implementation?

3.1 Host Agency Presentation – Mountain View Corridor Project

Bryan Adams, Todd Jensen, and Teri Newell from the Utah Department of Transportation presented on a large project in the state. This project, the Mountain View Corridor expansion and new alignment, covered 35 miles along Mountain View and 45 miles along the I-15 corridor.

After the presentation, participants asked questions and discussion ensued. The following sections outline the main topics discussed during the question and answer session.

Contract Delivery Methods

I15 – Used fixed price/best design. design-build used; had to first figure goals of the project. EIS covered 43 miles, but legislature wasn’t going to fund enough to cover that. Traffic and infrastructure condition challenges. Design-build lent itself really well b/c UDOT had a fixed budget. They ended up getting an extra 10 miles constructed due to savings experienced. Maintenance of traffic was key to this corridor. Having multiple contractors (3, 4, or 5) working in different sections without any scheme wasn’t going to work; they needed one contractor. Speed and accelerating delivery was necessary. MV – CMGC used. Wanted to get contractors on board quickly. CMGC selected b/c they couldn’t get going fast enough to use design-build.

Procurement

I15 – legislature picked from options presented by UDOT. UDOT told contractors how much funding they had and prioritized what they wanted. UDOT had a lot of traffic models for this project. Ended up with 24 miles and 10 new interchanges.

MV – Were allowed to stagger procurements. Had a much smaller procurement process. After contractor hired, started working on design and pricing. There was a rail line that went through MV corridor. 1 year into construction, signed an agreement with copper mine to move rail line which eliminated skewed rail bridges, rail-grade crossings, etc. Ended up changing dirt plan one year after

construction started. Had open book pricing gave confidence they were getting the numbers they were getting.

Risk and Change Management

How could you stay on budget and on schedule?

MV Corridor – went through extensive risk analysis process. Priced the job 4 separate times; did a risk assessment every time, which was painful; came up with every single thing that could go wrong with the project. Used a statistical approach to identify the likelihood the bad thing would happen. When first priced the job; used the red risk curve – had 90% confidence of completing job at projected cost. Did this without contractor input. Once contractor brought on board, price went up b/c they found more risks. Got more detailed with design and worked towards trying to eliminate some of the risks; as risks were eliminated, they were able to reapply the funding that would have covered that risk to other parts of the project. Pricing the same job (no change in scope) for all 4 pricings.

I15 – Had a risk workshop that included 3rd parties to collect risks; then decided who would be better at taking on the risk – UDOT or the contractor. There are still change orders with design-build. Identify the risks early. Halfway through project, assessed risks again.

Utility/Third Party Agreements

I15 – shared utility risks; get utility agreements with 3rd parties early when using design-build process. Some will only sign agreements with UDOT and not the design-build contractor; the utilities also want to do their own work. Identify the risk and decide who is best to manage it and then set up the agreement. Everyone needs to worry about all of the issues on the project. Don't just say "that's my partner's problem." If it affects the project, it affects all partners.

MV – they took the risk on their project. Took majority of the risk on their utilities. \$30 - \$40M worth of moves for lines to the north. Contractor led utility discussions – it was unusual to have a contractor lead this group, but it was UDOT's responsibility to get agreements in place. UDOT and utilities each had information on each other's schedule. Would try to schedule agreements for when utilities needed them in their area.

Right-of-Way Acquisition

MV – Had over 400 properties that UDOT was purchasing. ROW budget was \$320M. Had contractor on board, but didn't have any ROW. Based on where contractor wanted to work, they would schedule acquiring property. Did best they could to get property in a timely manner b/c it affected contractor's schedule. There were changes in the schedule based on when property was needed.

I15 – Coming out of EIS, they were looking at 700 parcels. Getting master agreements in place for utilities is critical. Got down to 400-500; prioritized the properties they needed. Business relocations need to be a priority. Had 10% ROW acquired when contracted with design-builder. UDOT recommends a higher percentage than that. Ended up using some consultants to help acquire the

properties needed. At time of contracting, gave contractor list of 10% that was clear as well as list of properties to be acquired. Contractor might say that he wants to build in a completely different way which could require re-prioritizing the acquisition of properties.

Keeping project on time

I15 – have to let go of some of the control; the more you insert yourself into the contractor's process, the more you can slow down the project. Use processes to make sure you get a quality project, but don't bog down the project. Help facilitate getting things done. Contractors will help with work-arounds when they see you working hard to get properties acquired. Get enough processes in place to make sure you are getting what you need, but don't interfere too much to hinder the schedule.

MV – Project did not have a compressed schedule; able to optimize schedule to get the most scope. Leeway to get the most out of the pricing.

Quality Management

MV – UDOT construction crews used for inspections. Region staff like to stay involved in projects. UDOT region staff used for inspections.

I15 – QA/QC performed by contractor. When looking at staffing project, 100 were being allocated to managing the project. If could have done it with State DOT forces, would have. Put DOT people in key positions. It's a UDOT/consultant team that is managing the project and can't draw lines. I15 is resource driven. On design-build, need to make contractor responsible for quality control. Had a 3rd party entity who reported to contractor and UDOT on quality assurance. UDOT had an oversight role; they would audit QA firm to make sure they were doing their job. QA firm had dual reporting. QA firm hired by contractor.

Project Staffing

I15 – Used UDOT and consultant staff b/c of sheer size. Had nearly 100 FTEs. They were managing the contract, reviewing the design, construction oversight, etc. Staffing based on volume of the work. It's an effective way to get the work accomplished. Create a team; it's not UDOT or a consultant...it's a team.

MV – A need for resources; designing 15 miles of the corridor. Building outside lanes first and interchanges later on part of project; frontage roads built first and then freeway later on another. Big design effort. Needed extra resources to do that. Have independent cost estimators.

The Digital Jobsite

MV – Using FAX program; most work done through ProjectWISE

I15 – ProjectWISE is great software to store data. Needed to route a lot of things throughout department for review/approval. Used SharePoint to be able to do this. It's a one-stop shop; have everything needed for the project. SharePoint is web-based. Using this system never doubted that the most current versions were in hand. Can set it up so that it's secure. Documents information all the

way from procurement to closing the project. Can see punch lists and the progress with them. Work smarter, not harder and this system helped them.

Performance Measures

I15 – Develop goals and needs for projects. Set 5 high-level goals for I15. Always ask the question, “Is what we’re doing today meeting one of these goals?” Staying with the budget was one goal. Able to return \$230M in funding. Another goal was to finish project in fall 2014; they will deliver on December 15, 2012. Need to communicate these goals to the contractor.

MV – Also opening December 15, 2012. Did not address performance measures.

Environmental reviews done within a couple of months of each other; got funding from same bonding package; started construction about the same time; and opening on the same exact day. Used different delivery methods, but this demonstrates that if you pick the right method, there is no difference.

Q&A

Q: Did you use standard specs?

A: I15 – used standard specifications, but did have to make some modifications. For example, define who “the engineer” is and who was responsible for the risk.

Q: Acquisition of ROW can take 180 days, even if it’s only 2 days. How did you short circuit?

A: MV – When saying have contractor hired, that’s in pre-construction phase. If they could snag a big property that was 2 miles long, that gave them a stretch to start working in. Had a big ROW team and added staff to get the properties. Didn’t short circuit process, just threw a lot of resources at it. Suggest you work on business relocations ASAP. Find the long-lead items and get started on them early. Can’t short circuit the process. Use strategy to get right of occupancy; still have to deal and work it out, but can be on the property. Tell agents to work with property owners and assess if they will work with the State or if they are going to be difficult. If owners are difficult, they go to condemnation. Set scheduled based on worst-case, condemnation. Try to beat that though. Also have ability to get permits that allow access to property, but that kind of just kicks the can down the road and leaves a lot of follow up paperwork for UDOT, but it gets the contractor on the property.

3.2 Topic 1: Determining Staffing Levels on a Project

Roxana Garcia-Zinsmeyer from the Texas Department of Transportation gave a presentation on innovative practices in Texas to help balance staffing needs for construction. The following raw notes represent a summary of the presentation session.

Texas has 25 Districts broken up into 4 regions. Regions formed to help with staffing with multiple districts. Districts are local presence – they are the people on the ground. Regions provide project delivery and operations support.

Two types of staffing groups on the ground.

1. Strategy 101 – engineering staff
2. Strategy 105 – maintenance staff

TxDOT matches inspection with workload. It's human nature that if a person has too much to work on, they focus on the highest perceived priority, short cuts are taken and quality checks are skipped. There can be too little inspection. If there is a bridge pour and one inspector, there might not be depth checks.

Long term issues with too little inspections are predicted premature fatigue failures, higher turnover, etc.

When there is too much inspection, there is an increased construction engineering cost, public and legislative scrutiny (drivers see people standing around), too many inspectors are giving contractor direction.

As a result of performance reviews (sunset review, restructure council, etc.) told they need to staff appropriately.

TxDOT has stable funding of \$2.5B/year. They also have some one-time infusions of cash (for example, ARRA).

Started using construction staffing models. First method was a spreadsheet that took a snapshot of that moment in time. Looked at volume of work under construction. Will get the number of inspectors needed for work taking place right now. Looked at 3 groups of people: field staff (inspectors, engineers, etc.), support staff (record keepers, lab personnel), and manager.

Made some assumptions. For example, one inspector can handle \$250K/month. One seal coat inspector can handle \$850K/month. Also assumed there would be a sharing of work duties. Might also use inspector to perform record keeping. One manager required for 14 employees. One inspector can handle 10 local-let projects.

TxDOT then hired the Center for Transportation Research (CTR) to provide a different point of view (top-to-bottom model). They acquired information on the construction engineering (CE) cost. 2nd model helps them understand better what they need to plan for. Developed a statistical model that uses (1) project class and (2) construction cost estimate to calculate. Model estimate show much funding there would be and how many inspectors would be needed. Also shows seasonal peaking of construction work. Analysis lets them know how many inspectors they will need in the coming months.

Need staffing at levels that allow inspectors to take vacation, sick leave, and time they must take off d/t overtime or night work.

Staff at levels that allow time for quality checks.

Allow for some temporary "overhiring."

"On call" consultant use – Most DOTs in the SW region are using consultants to some degree to supplement their staff. The scope of work varies from simply supplementing existing staff with consultant personnel to having consultants inspect complete projects. Challenges exist with the process

and time required to get consultants on board. The use of work order contracts that can be initiated quickly when the needs arise are being used by some DOTs. Some DOTs are using a form of “on-call” consultants who may be called upon with little advance notice for specific inspection tasks.

Discussion also arose concerning the cost of consultants and the need to qualify consultants. The group discussed the staffing models being used to account for the size of the DOT staff and noted that consultant inspectors were paid more than DOT inspectors. DOTs noted some inspectors left state employment for the higher pay of consultant opportunities.

Current best practices...

- Now call everyone general engineering staff (no longer have 2 types of employees). This allows staff to go from construction to maintenance and back without a title change.
- Use of summer engineering students to supplement inspection forces.
- Work sharing between Districts.
- Use consultants
- Use inspectors for design work in the winter, use design staff in the summer for construction.

Next steps...

- Validate results, remove DRAFT stamp
- Make model repeatable and full automated
- Use output as basis for DOT staffing Plan and upcoming legislative appropriations request
- Merge output with project development plan to produce one model, capable of calculating total engineering staffing needs based on multiple funding scenarios.

Participants also discussed agency staffed versus consultant inspection as a staffing issue. The contractors present preferred DOT inspectors over consultant inspectors for the following general reasons:

- Decision-making, especially when financial impacts may occur
- Consultants may not take risks, may want to run everything through DOT
- Better knowledge of the work
- Better knowledge of the workings of the DOT
- More partnering efforts with the DOT inspector
- More respect for DOT inspectors than consultants.

Though contractors may prefer DOT inspection, the use of consultant inspection will continue. DOTs need to level their workforces and cannot staff for the peaks of workloads that vary from year to year. Due to civil service rules, many DOTs are not able to move their employees frequently. Another area of focus is testing. Contractors may be able to also do more testing in addition to more inspection. This follows the shift already occurring towards having quality control activities done by contractors. There is always the need for verification testing by the owner for acceptance. FHWA has guidance for how contractor testing for acceptance can be performed (<http://www.fhwa.dot.gov/construction/t61203.cfm>). A joint effort between contractor associations and the DOT could be established to set standards and improve implementation in this area. The DOT

must be aware that the shifting of additional testing does not come without risks and costs to the contract.

Q&A

Inspectors check by project and not necessarily by work activity. Track how many hours are being spent on a project in total.

Q: Model based on earnings/month. How does model adapt to contractor activities/work schedule that overlap?

A: First model doesn't adapt. It will give a general idea of how many people are needed out there. Area engineers still need to monitor what the contractors are doing and how fast they are working. Knew there were going to be agency cuts and wanted to be proactive to be able to go to legislature and say that cuts had been made so legislators didn't need to come after TxDOT for cuts. Want to be able to use consultants and use funding to hire private firms to supplement field staff. A lot of resource sharing across the state. Have inter-District agreements.

Q: How do you shift resources without disrupting lives of inspectors and their families?

A: It's hard; try to bring people in from Districts that are just one hour apart, but it's harder in Western Texas: because some Districts are 800 miles apart. A lot of people commute too. Have hired new inspectors and housed them in different regions as opposed to Austin.

3.2.1 Practices Used

Discussions focused on several practices currently in use by States in the Southwest. Participants offered examples related to the topic and the facilitator asked related questions about specific practices. Documentation of the discussion is outlined in the following bulleted list.

- UT: Cross train maintenance and inspection (transportation technicians).
- AZ: Similar multi-functional career paths to UT.
- TX: Created a "general engineering technician" labor category.
- CO: non-project specific, regional contracts with task orders; level of consultant staff varies by project.
- NM: Use of MS Project to evaluate staffing needs (historical needs by project).
- AZ: On call contracts with large percentage of consultant work.
- AZ: web based cost tracking tool (share).
- FL: Cost comparisons between in-house vs. private/large projects to construction CEIs.
- NV: work with Districts to determine needs – construction use leveled off 4-6 months.
- HI: CMCSS (management and support services) contracts.
- UT: open stakeholder meetings – consultant RE; need State representation (EOR).
- UT: contractors rate Res for assessment/performance measurement.
- OK: Stakeholder task force for review of consultants.
- AZ: staff at 80% and use cost models.

3.2.2 Challenges

Several common themes emerged from the discussion on challenges, as outlined in the following bulleted list.

- Which people and how many to transfer across.
- Unionized forces and applying model.
- Training challenges based on work requirements and needed certifications.
- Who manages contract for owner.
- Time to get contracts in place for on-call task orders may shorten time.
- Contractor/consultant communication vs. contractor/DOT communication.

3.2.3 Actions Needed

Agencies discussed actions needed to further implementation of practices related to this topic.

- Need expanded employee development and opportunities.
- Need authority and management structure for decision-making and (time).
- Techniques for reducing inspection needs
- Contractor tests/verification for acceptance.

Additional discussion items for this session:

Rob Wight (UDOT) – 10 years ago product quality improvement team looked at staffing levels to be ahead of agency cuts. Looked at combining construction and maintenance staff, for example, having snow plow operators inspect projects in the summer. Try to keep inspections in same maintenance area so that he has buy in on the project b/c he's going to have to maintain it when it's done.

Julio Alvarado (ADOT) – Challenge is keeping maintenance staff busy. So one requirement is that maintenance staff have CDLs. Got a lot of help from HR. Get a lot of training so that they are cross trained. Go to multi-function staff.

Scott Jarvis (Caltrans) – Asked about how employees are classified and equality among staff with these classifications.

TX – classifies employees as general engineering staff.

TX and UT – not unionized.

UT – 2 District engineers per region.

UT Challenge – there are some people that you just don't want in a snow plow. There are some people who are good with equipment, but not good at other things. It can be a challenge to hire someone with both skill sets. Heard a lot of, "this isn't what I signed up for." But it's a way to increase your staff resources.

TX – Not everyone was happy when they created general engineering tech position. Some people were happy with the change because it created more room to grow. People had more opportunities and time to grow. They also became more competitive and had better incomes.

UT – Employee development/opportunities was a huge selling point.

How do you determine what goes out to a consultant; do you turn entire project over to a consultant or augment.

CO – Maintains non-project specific contracts with consultants and use them on a task order basis. Can execute a task order within weeks, but it varies by project. Construction work load varies from year to year, so the contracts are on a regional basis.

NM – (Aaron) he has 5 construction crews under him and he knows how many projects they can handle and he supplements with contractors/consultants. Uses a 4-year on-call contract that is \$1M; once it reaches capacity will amend it. Have 4 firms with contracts. It usually takes about a week to get them on board. Aaron will determine what his gap in and then use the consultant to fill the need.

NM is down by about 20% in staffing so they are hooked on augmenting with consultants.

AZ – uses a lot of consultants. Use on-call contracts.

UT – asked who is actually managing the on-call contract.

NM - Armando (central) manages the contract; District asks for a person and Armando gets him but the District (Aaron) manages the person. On-call contract is centrally managed.

AZ – On-call contracts are also centrally managed. Use a web based system to track the actual costs. AZ is a right to work state. Julio started seeing contractors jumping from firm to firm to make more money. But now ADOT tracks the data and requires certified payroll costs.

FL – Unloaded rates have gone up 15% at the same time that FDOT salaries have flat lined. So even though legislature wants to reduce state work force, it's costing more. All in house inspectors will be gone by 2016 in Florida. Trying to hire additional project managers as a result of more outsourcing.

NV – Down by about 15-20% workforce. See consultants are more expensive. Program is slowing down and not planning to hire additional consultants. Going to try to do more in-house staffing. Feels like they are more reactionary. Used to have on-call lists, but ran into a bind and must RFP everything. We are our own worst enemy sometimes.

CO – Takes 4-6 months to get an on-call contract in place, but task orders are fast. Can't write a task order for anything over \$500K; above that threshold they must consider a project specific contract.

HI – very decentralized. Central office manages most policy and not hands on guidance. Use consultant contractors for more complicated projects for project engineering and inspection staff. Must empower consultant to make decisions. Contractors shouldn't regard the onsite project engineer (as an example) as a consultant or State DOT employee. They should not see any difference.

TX – has had same discussion with AGC. Timeliness of decisions is an issue. TxDOT wants TxDOT project manager on the team to help alleviate this issue. There is an opinion that there is a TxDOT way of handling projects and a consultant way of handling projects; contractors don't like the consultant way. (This came up from several states.)

OK – Sometimes there is only an inspector out on the job and they don't get the same respect from the contractor as an ODOT staff person would.

UT – UDOT met with executives of larger contractor firms to discuss what is working well and what is not working now. Biggest issue that came out of those discussions is consultant onsite project managers (aka resident engineer). This needs to be figured out b/c UDOT is not going to get any more staff. They need state staff to help, especially with the gray areas.

UT – starting a rating system for contractors to rate their resident engineers (RE). Hope this will help with improvements.

NV – their industry is looking at the same thing (rating system)

OK – Pick 2 or 3 projects each year with an independent task force and review the consultants and provide feedback to people designing the contracts, but also the District.

Have a management process in place and a clear scope.

TX – Administration requested looking at change to specifications to reduce resource need (aka inspections).

David Unkefer – heard that getting a process in place; manually every year. How does resource “leveling” happen? TX will still be doing this manually – they don't have a tool to look at it statewide.

AZ – want to staff at 80%; anything above that, they go out to consultants.

3.3 Topic 2: Establishing Qualifications for Contractors

David Sadler from the Florida Department of Transportation presented on FDOT's process for contractor prequalification and evaluation. For contractors that don't have a performance history with Florida DOT, they use Contractor Past Performance Record (CPPR). This system grades contractors on a variety of variables (including things like timeliness). This generates a score. FDOT implemented their current version about 12 years ago. Contractors get a score on their project when it's finished. When there are poor performance issues, it can generate 4 different actions. Two include letters of concern and restricted bid capacity. Other actions include time off bidders list and revocation of qualifications. Letters of concern will be triggered by 2 or more instances of a CPPR score that is less than 76. FDOT can limit capacity by which contractors can bid. This can be triggered by quality concerns. Time off bidders list is dependent on responses from contractor and improvements made. Revocation of qualifications is most serious; usually the result of being defaulted or major performance concerns. It doesn't happen often. Discretion is FDOT's for the amount of time that this happens. Information on FDOT qualification process is available online.

Q&A

Q: What are performance measures? Who measures it? How is subjectivity removed?

A: Measures are defined in rule 1422. For example, look at personnel resumes to make sure the correct number of years of experience (as defined) in rule are correct. Prequalification Specialist with lots of construction experience is reviewing the resumes. If there is not enough experience in asphalt (as an

example), contractor will get a letter that they were not found prequalified in asphalt due to lack of experience. Contractor then has an opportunity to provide additional information or let FDOT know where they missed it.

Q: Is past performance a part of the performance measure?

A: yes, the CPPR is a major element.

Q: What about contractors who haven't done work yet in Florida?

A: New contractors starting work in Florida usually start with a score of 75.

Q: Is there a final summary from project engineer at the end of a project?

A: Yes

Q: But that's where subjectivity can come into play.

FDOT lets 500 jobs a year.

Q: How much resources are needed to implement this prequalification process?

A: Not much; use a lot of information from the field which is compiled by personnel who are already out in the field. FDOT doesn't short list for design-build firms anymore. Legislature didn't think FDOT should be in the business of deciding who was good enough to short list. Will accept letters of recommendation from other States from firms doing work in Florida for the first time. Score determines how much a contractor can bid. Joint meeting b/w FDOT, contractors, and consultants led to contractors getting proposal evaluator comments and scores. They only get the evaluations of their own proposals, not those of other bidders.

Q: Is there an appeal process for a contractor when they get a letter of concern?

A: Letters can be appealed to one level up.

3.3.1 Practices Used

Discussions focused on several practices currently in use by States in the Southwest. Participants offered examples related to the topic and the facilitator asked related questions about specific practices. Documentation of the discussion is outlined in the following bulleted list.

- CO: 5M, 5 – 10M, 10 – 20M, 20+M thresholds can adjust pre-qual bid level if warranted; contract management system used for >\$100K
- NM: Developing pre-qual system; registration and bond requirements
- NV: financial data review; performance evaluations for previous projects
- CTR: Specific issue of difficulty on one instance might negatively affect "subjective" nature of evaluations.
- Comment: TRB/NCHRP report on topic
- NJ: Study on contractor performance to share with this group
- FL: Work to not allow scores to be affected by relationships/issues; prime is responsible for sub's performance
- NV: Rate major subs
- Question: How frequent should ratings be?
- TX: once a year

- FL: once a year
- CO: 2 years
- AZ: once a year (3 people)
- AZ: Financials may not be biggest issue; work/job type
- CA: Rely on bonding/state licensing boards
- NV: Require performance bonds
- Method or performance specs
- CTR: measurable instead of subjective
- UT: Developed rating system in conjunction with industry; exceed requirements – better score
- TFHRC: Research into models for this and guidance in near term.
- FL: Contractor responsible for performance after contract closed.
- CA/CFL: no pre-qual
- UT: project pre-qual (markings)
- NV: project pre-qual (bridge)
- CO: IDIQ for erosion control after the fact
- FL: prime 40% of work
- NV: 50% of work
- NM: 50% of work
- AZ: material costs count toward prime percentage
- CTR: Technically challenged projects should have alternative contracting techniques and low bid is okay on others.

3.3.2 Challenges

Agencies noted one primary challenge from the discussion, as outlined in the following bullet.

- Subjectivity in approaches to evaluating contractors.

3.3.3 Actions Needed

Agencies discussed actions needed to further implementation of practices related to this topic:

- Need guidance on objective processes that can be used to maintain a level playing field.

Additional discussion items for this session:

CO – Have 2 people who work in the awards unit and responsible for prequalification. Very rarely do they find that their applications are rejected. Audited financial statement is usually the reason if one is rejected. They have identified thresholds for how much a qualified contractor can bid. CDOT is starting to see more scrutiny from their legislature. Does it apply enough fair opportunity to allow firms to bid on projects? Want to incorporate project results as part of the process.

There is a new form that is time consuming that must be filled out by anyone in Colorado who has a contract worth \$100K or more. It was developed by the Office of Personnel as a method for transparency; it allows the public to see how contracts are being managed. Form asks if entity met terms of the contract. There are 3 rating levels: exceeding expectations, meeting expectations, failing expectations.

NM – their system is that if a contractor has a tax ID number, they are qualified. Looking at developing a system with an administrative code like Florida.

NV – accountant reviews financial data from contractors annually. Review evaluations from the resident engineer; those can really be subjective. There is room for improvement; mainly b/c of the subjectivity.

Contractor (Jeff) – Can be a really good contractor, but has a big issue and struggles through it but gets a bad evaluation that could have long lasting effects.

Florida – that's why they implemented a tiered system – as a way to avoid bad contractor evaluations b/c of poor relationships. Resident Engineer is going to be the one issuing the letter, so he should be doing his due diligence to make sure there really is a problem and that it's not just a bad relationship.

HI – there is an NCHRP or TRB report on past performance. NJDOT had a program to provide objective evaluations to contractors.

TX – Has 4 people who work on prequalifying and they are overwhelmed. Is there a reason that contractors qualified every year, or are some States using a different system?

CO – qualifies every 2 years.

FL – qualifies every year.

NV: Do States qualify based on work type?

AZ: yes, you can be qualified for all construction, or just for asphalt. Just b/c someone has a general contracting license, doesn't mean they can do all types of work. For example, Alvarado Landscaping has a general contracting license, but they can't build a bridge; they don't have the right experience, equipment, etc.

CTR: Establishing qualifications needs to be measurable and not subjective.

UT: Has worked with industry to develop a rating system together. Trying to capture above and beyond the specs.

TFHRC is looking at doing some research, specifically looking at what is done in Canada where contractors are allowed to self-bond if they get a high score.

CA: does not prequalify contractors.

UT: Has used prequalification process for a specific project.

NV: Has also used prequalification process for a specific project (used it on a cathedral arch bridge, which is something they don't do every day).

Contractors don't necessarily want a level playing field; they just want the process to be objective.

Project Decision-making and the Need for Understanding Lines of Authority within the DOT is an area for improvement. Contractors cited and DOTs acknowledged that sometimes consultants are not making

simple decisions and feel the need to check everything through the DOT. With the use of consultants on the rise, there is a need for better communications and understanding of the lines of authority between DOT, consultants, and contractor personnel. An understanding of who makes decisions and how they are made becomes one of the most important factors, with all three parties needing to completely understand who can do what and who has the authority to make the decision. Along these lines, DOTs must empower consultants to make decisions as though they were DOT employees. The contractor should not be able to tell the difference between DOT personnel and consultants. This can be accomplished with routine project meetings especially if open communications exist between all parties.

3.4 Topic 3: Assessing Inspection Levels of Effort with Risk-Based Processes

Julio Alvarado from the Arizona DOT presented information on ADOT's Quantlist System, which was implemented in 2002. Quantlists are quantitative checklists that provide a snap shot of work at the time of inspection which records compliance and noncompliance. It converts attributes to numbers and allows for objective evaluation. The benefits include: improved quality, ability to identify recurring problems, ability to determine specification effectiveness, ability to determine training needs, better tools for new inspectors and contractors, helps set Department goals, and measures conformance to contract specifications. ADOT uses Quantlists for quality assurance, office record of acceptance of work, day to day checklists, requirements reviews at preconstruction and pre-activity meetings, consultation (training) reviews, and to measure conformance to contract specification. ADOT currently has 92 Quantlists for most items of work.

3.4.1 Practices Used

Discussions focused on several practices currently in use by States in the Southwest. Participants offered examples related to the topic and the facilitator asked related questions about specific practices. Documentation of the discussion is outlined in the following bulleted list.

- TX: Inspector development program modules for each item in spec. book – signed off by mentor.
- CO: Has some checklists (manufacturers also provide some).
- CA: benchmark inspection guidelines.
- UT: inspector manuals; also use videos for training – no risk based.
- NM: included in instruction manual.
- NV: Work Zone Traffic Control checklist (provides guidance on low, medium and high priorities); QA checklist.
- FL: critical requirements.
- CTR: Quality Manager/quality process; project specific lists (by State).
- CTR: work plans for project elements share checklists and information; catch issues early.
- NV: HQ resources but staffing managed at field/district level.
- UT: varying activities for innovative alternative contracting projects.
- UT: acceptance and documentation manual
- HI: Line items for inspection and testing.
- TX – has a whole training program devoted to inspectors. It covers every item in the spec book and might take 1-2 years to get through the whole thing.
- NM – developing a construction guide. Has a bunch of checklists. Construction guide will mirror the specification. For example, with striping there will be some dos and don'ts and things to look for. Hired a consulting firm to assist with this. Each District Engineer is responsible for a section of the spec book.

- NV – Moving towards checklists. Have a work zone checklist and a Q/A checklist.
- FL – has critical requirements.
- CTR: use job-specific checklists on what to check.
- CTR: constantly training people.
- CTR: have an internal checklist; it would be wonderful to have other State DOT checklists; it's not the contractor's goal to build something bad and they want to be prepared for State DOT inspection.
- CTR: have a pre-activity meeting and have post activity cards that must be filled out in the field and turned into QA/QC people.
- NV: Paper based system. So with WZTC checklist, some people will fix the issue and then fill out the checklist so that project shows perfect traffic control for 500 days in a row.
- CA: Developing a construction management system that will allow them to capture more information on material testing.
- AZ: recommends looking at AASHTO report on best practices.
- NV: get feedback that sometimes their training doesn't match with needs of new hires. Have their own test methods and certified testers. People in the field make the decisions about training.
- UT: from time to time check to see how things are going. If there are gaps might use training or additional staff on the project.
- NV: Need a culture change; putting more quality control responsibility on the contractor.
- HI – people are human and will make mistakes. Include a line item for contractor inspection.
- UT: Made manual interactive with videos and this got a good reaction. Inspector can watch video on how to perform a slump test before he goes out to actually do it.

3.4.2 Challenges

Several common themes emerged from the discussion on challenges, as outlined in the following bulleted list.

- Reporting what was corrected exactly when checklist is completed.
- Resources to accomplish needs and balance staffing for this.
- Scalability for small and large projects.

3.4.3 Actions Needed

Agencies discussed actions needed to further implementation of practices related to this topic.

- AASHTO SOC report on best practices (share with group).

3.5 Topic 4: Developing and Tracking Meaningful Performance Measures

Scott Jarvis from Caltrans presented on a variety of performance measures currently in use in California. When set up correctly, performance measures can help States manage their construction program. Caltrans headquarters personnel focus on policies, procedures, training, and provides expertise. District offices then implement the guidance provided. Caltrans makes sure that performance measures tie in with the State DOT's strategic plan. Caltrans mission is to improve mobility. To get to performance measures, agencies have to look at the big picture; the DOT's mission, vision, values and goals. Caltrans presents performance measure quarterly to the Construction Management Board. They reassess performance measures annually to avoid stagnation

Caltrans has sets of construction performance measures:

1. Design through construction performance measures
2. Division of construction primary management Indicators
3. Additional management indicators

Caltrans provides a summary every quarter throughout the State. It lists the performance measure and shows how DOT is doing statewide, but also how each District is performing. One major area for performance measurement is safety. Another performance measure is incidents requirement medical attention per 100 employees. Cost is another performance measure (aka management indicator). Caltrans recently added “projects requiring additional funds afterward” as a performance measure in the cost area. Another schedule based measure is to issue the Proposed Final Estimate (PFE) within 40 days.

Q&A

Q: How many measures are automatically generated?

A: Once system is in place, it's efficient. Have 1 person (and it's not his full-time job) and in 8 hours or less can get measurements. The queries are in place and the system will automatically generate results.

Q: Have decisions been made so that performance measures are not negatively affected?

A: Have to balance performance measures (like a check and balance), b/c they can affect behavior b/c people want to meet or exceed PM goal. Have to have a suite of performance measures for balance. Can't punish people for doing what they have to do to administer the contract.

Q: How do States measure time?

A: Trend is towards calendar days instead of working days b/c it's easier to keep track of.

3.5.1 Practices Used

Discussions focused on several practices currently in use by States in the Southwest. Participants offered examples related to the topic and the facilitator asked related questions about specific practices. Documentation of the discussion is outlined in the following bulleted list.

- FL: CEI costs and URC for LDs; determine daily rate related to time measure.
- Focus on performance measures of high value; safety, cost, schedule, quality.
- CO: timeline delivery of contract execution.
- AZ: measure addendums.
- CA: ready to list and impacts from early activities (utilities).
- NM and UT: tract design related change orders.
- CFL: project management tracks from start to completion.
- CO: annual updates to stewardship agreement; within last 2-3 years for others.
- UT: general performance measure dashboard – web.
- CO: has a Transportation Performance Branch – for reporting.
- Some publish reports.
- Mapping of project status.
- AZ: process improvement to ensure value.
- NV: time and cost

- UT: crew costs vs. overall percentage complete and public perception; tiered approach to performance measures (audience)
- AZ: public involvement and reporting of information (public perception)
- NV: share success stories; hired PR firm for public perception
- Use root cause analysis to determine “why” for performance measures (bad and good)
- AZ: evaluates safety, cost, schedule. He noted how Caltrans is adding quality. No value in measuring something, but not doing anything about it.
- CO: Looking at timeline delivery of executing contract to be able to report to legislature. Looking at how long it takes to get paperwork from contract; is there a delay in making modifications to plans while project is under advertisement.
- CA: Challenge - project managers rated on RTL (think this is ready to let). It used to be that it took whatever it took to get the project delivered, but now the culture has shifted and that’s not the case anymore.
- NM: Old administration would force letting projects at original advertisement date whether everything was ready to go or not (for example, if a steel spec isn’t ready). New administration is willing to pull project from letting and advertise later.
- UT: One solution to pushing projects at targeted advertisement dates is to add addendums later.
- CFL: There is no project management hand off; they go from cradle to grave and this has helped.
- AZ: Incorporates some of the FHWA Division Office reporting requirements to FHWA HQ into their performance measures. The FHWA DO is going to ask you (State DOT) anyway, so may as well get the information.
- AZ: Looking at developing a dashboard; they’ve looked at WSDOT and FDOT.
- UT: has a dash board; it’s pretty general and it’s good for the public to see the big picture.
- AZ: looking at a general dash board for the public; more detailed internal. This gives someplace for the performance measures to go.
- CO: has just created a performance management branch. They just finished developing a dash board.
- UT: dash board helps with credibility; it’s positive for the public and legislature; it’s a great use of the data.
- AZ: by identifying what the hold ups are with construction (i.e. ROW) it helps with project delivery b/c people understand where the hang up is.
- NM: Must have meaningful measurements. Don’t track things that don’t mean anything. Only certain things are worth tracking; you can’t track everything.
- FHWA: Important to look at what you are measuring.
- CTR: Will have a different set of measure depending on who the audience is.
- NV: has 2 formal PMS - time and budget
- AZ: Has Public Affairs personnel who funnel/share data with the public. Don’t get criticized by media and public is happy when ADOT says they are closing the road this day and then they accomplish what they said they will accomplish. If public is informed, they will plan to take an alternate route. Use the data to tell a story.
- NV: It’s important to share DOT successes. Hired a PR firm “Orange Today, Blue Tomorrow”. Got public involved and went door to door. When you get in and get out, that helps a lot with future projects.

- During the discussions of performance measures (PMs), it was noted that it is a good practice to group PMs by category. In general, DOTs are using PMs for different reasons — some for internal agency improvement, others to report to the legislature or the public.
- Participants generally noted they are measuring between 18 and 85 different areas, and that not everyone needs to be knowledgeable in all PMs.
- Agencies generally cited use of measures that align with the goals of the DOT. If the goals are to deliver projects on time and within budget, the PMs to be measured should indicate whether the project is on time and within budget.

3.5.2 Challenges

Several common themes emerged from the discussion on challenges, as outlined in the following bulleted list.

- Ensure reasonableness of how things are measured; also have to be reasonable on time to measure and focus on highest impact/benefit of measures (payments and project closeout).
- Performance measures by target audience – managing a reasonable list.
- Measure things and then measurement data just sits in a computer. Need to ask, “Are we measuring the right thing? Why are we measuring it, and is it making a difference?”
- Measurements can drive the wrong behavior.
- There was no set acceptance of which PMs to use or how to categorize them, as each DOT had its own methods, standards, and business practices.
- The value of any PM must be continually reviewed and its effectiveness determined. DOTs questioned the level of resources that should be devoted to reviewing PMs. There was no definitive answer especially considering the necessity to dig into the root causes of any change.

3.5.3 Actions Needed

Agencies discussed actions needed to further implementation of practices related to this topic.

- Focus on measures that benefit – show user benefits.
- Use general categories by audience and develop performance measures for each.
- Useful PMs may include the number of change orders adding new items, quantity errors/corrections, days late, delays caused by utilities or plan errors, total cost above original contract, etc. The PM should indicate what caused these changes to occur. If one cannot drill down to find the root cause, something else may be a better measure.

3.6 Other Regional Priorities - Ideas for Implementation (open session)

Scott Jarvis from Caltrans facilitated this session, as the group brainstormed on topics that were of greatest interest to the group but not already covered in the agenda. The following sections highlight discussion notes for the topics selected – work zone safety and using performance-based specifications.

Topics captured during brainstorming session:

- Dispute resolution claims – alternative dispute resolution processes; use partnering, dispute review boards
- State DOT’s role in oversight
- Training
- Partnering with regulatory agencies, railroads, and utilities (other stakeholders/third parties)

- Construction public relations campaigns
- DOT/industry partnerships and collaboration
- Safety – within agencies, but also with workers and construction staff
- Processing paperwork electronically – executing contracts, change orders (contract administration) electronically
- Streamlined templates for change orders or supplemental agreements
- Non-destructive testing
- Project scheduling tools
- Change to performance based rather than method based contracting – allowing contractors to use innovations, performance based specifications

Work Zone Safety

- Tie safety to pre-qual process
- Nighttime construction challenges
- TX: task force to exceed MUTCD requirements
- UT: roundtable with AGC (task force) for focused contractor safety
- Positive protection and law enforcement use in work zones
- UT: flashing light rule for construction vehicles; guidance for use of electronic devices (distraction)
- TX: policy for no electronic devices in work zones
- CA: measuring work zone crashes and causes of crashes; relationship to contractor practices
- NM: reimburse rate for off-duty officers; have an MOU; ad campaigns for work zones
- AZ and NM: blue and red lights on rear of construction vehicles
- Challenge: clear requirements in spec. to keep level field
- FL: motorist assistance: warning and speed display
- CO: Owner controlled insurance program. Challenge is contractor competitive advantage
- Worker exposure and motorist exposure
- Positive protection (Balsi beam example)
- Remove or cover signs not in use (enforcement)
- Training for human factors/behavior of workers/motorists
- Challenge: impaired or drowsy drivers at night
- CO: retroreflective tape on vehicles; spotter upstream in TCP; enhanced work zone patrols between 1:00 a.m. – 3:00 a.m.
- NV: flaggers assist pedestrians on work zones

Additional discussion items captured during the session:

TxDOT quarterly meeting with AGC. Have had 4 contractor workers killed since September. Are any States using safety in prequalification? What can be done within work zones? A lot of TxDOT work is done at night with little protection besides drums. Everyone is subject to the 2:00 a.m. driver who is not at 100%. Looking at greater TTC measures, but that can increase the number of days out doing work. TxDOT put a task force together to look at MUTCD. Want to come up with ideas to address the types of drivers out on the road today – want to think outside the box.

UDOT also had a roundtable with AGC b/c had 4 workers killed. UDOT formed a task force. Includes safety people from contractor and UDOT. Also brought in Resident Engineer. This committee will

continue on; it's not a one-time initiative. Want to use positive protection; requiring use of barrier or doubling up barrels. Increasing highway patrols. Also met with DMV to include a chapter in driver's training on driving through a work zone. AASHTO study on highway patrol in work zones (recently presented by someone from WSDOT). Added to the administrative rule to include flashing lights for construction vehicles. Developing guidance that workers should not be using electronic devices in an active work zone. Some exceptions for workers guiding construction equipment who need to be able to communicate.

TX – also has guidance for not using electronic devices in a work zone.

NM – has an MOU with law enforcement. Also has a public campaign when construction season starts to alert drivers that workers are out on the road.

CA – also pays CHP to patrol/enforce work zones

AZ – allows construction personnel to have blue and red lights on the rear of the vehicles.

NM – also uses blue lights – maintenance vehicles

CTR – make sure that safety elements are clear in specs b/c they come at a cost and everyone should be including it in their bid. On bid day, it's all about getting the job – so if safety elements are in the specs, they are not bid by everyone.

FL – use combination of work zone warning signs including speed feedback trailers and this has reduced speeds; want same level of respect in work zones that there is in school zones. On design-build projects, ask what company's EMR rating during prequalification process.

CO – owner controlled insurance programs. Safe contractors get a competitive advantage.

CA – most work zone fatalities are nighttime construction challenges or drunk drivers.

CFL – drivers lose respect for signage because the signs don't apply anymore, or they aren't covered when they should be.

UT – saw behavior-based safety when touring a coal mine where workers are in the dark all the time. If a worker is walking the barrel line when he doesn't need to, get him to walking 12' away.

There is a difference in how to improve safety of vehicles coming through the work zone and the safety issues of the work zone area (where equipment is driving around, etc.).

CO: Put reflective taping on backs of construction vehicles. Implemented a spotter system; sit about ¼ upstream of work zone and will radio if there is an errant vehicle – then air horn is sounded in work area. In specification so it's contractor provided. B/w 1:00 a.m. – 3:00 a.m. Colorado Highway Patrol starts patrolling for drunk drivers.

NV: don't forget about pedestrians in work zones. They provide "escorts" for pedestrians to get through.

Can't ever stop thinking about safety; it's not like a spec that you can revisit in 5 years.

Evolving from Method Based Specifications to Performance Based Specifications

FL: challenge is shifting involvement and allowing contractor to do more (QC); accept contractor QC results

UT: design build and DBB use what is good enough

CTR: clear, concise expectations in spec.

HI: nondestructive test measurements in PB; Excel color coded sheets on acceptance tests by stakeholder

CFL: Spec for contractor work that government normally performs (insp. testing example); machine control spec.; CFL will share these with the group.

FL: Have implemented some performance based specs. Combination of doing it on a program basis as well as a project line item basis. Challenge is letting go of going out and being so involved. What will help is the increase in the amount of design-build.

State DOT has to take more of a QA role instead of a QC role.

CTR challenge: When the results come back, it's not uncommon to hear from the DOT – "that's not what I was expecting."

3.7 Topic 5: Implementing the Digital Jobsite

Michelle Page from Utah DOT gave a presentation on UDOT's application of technology applications to enhance the digital jobsite. Some of the UDOT systems are getting outdated and not web-based, much less mobile-based. Getting information out of those systems is not easy. UDOT continues to use mostly paper documents and require a wet signature. Documents are scanned and then stored electronically. UDOT used SharePoint for a large project on I-15 to maintain work flows, punch lists, and issue logs. Immediate updates to documents were synced with iPads.

Short Term Goals:

- Focus on schedule and payment
- Consistent document management
- Complete electronic storage in ProjectWise
- Automated performances measures

3.7.1 Practices Used

Discussions focused on several practices currently in use by States in the Southwest. Participants offered examples related to the topic and the facilitator asked related questions about specific practices. Documentation of the discussion is outlined in the following bulleted list.

- NV: Field Manager implementation (2013); e-bidding; SharePoint; ProjectWise
- UT: ProjectWise
- AZ: Manual and electronic
- CO: SiteManager; ProjectWise; CRLMS; electronic signatures; rugged tablets/laptops for electronic field activities
- CA: paper based but developing electronic system
- CFL: EEBAACS – customized system
- FL: Allow consultant access to system; not LPAs or contractors
- TX: spreadsheets pull data from SiteManager
- NV: Considered MS Outlook voting feature for approval
- FL: contingency item for unknowns
- NV: Electronic permitting; have a champion for electronic documenting
- TX: accepts fax signature
- NV: Contractor used machine control for grading; use digital terrain models
- AZ, UT and CA: post award ADOT provides digital terrain model with disclaimer
- Transitioning to digital terrain model pre-award; respective agencies will share spec and disclaimer wording examples
- FL: use rover to work from same model as contractor
- LiDAR, intelligent compaction
- NV: implementing Field Manager. Using SharePoint and ProjectWise. Implementing an e-bid system. Challenge is remembering all of the different passwords. Design-builders are coming in and saying they want to use a system and wants NDOT to go with them. NDOT issuing iPhones and limited use of iPads. Question is whether they are business tools or a toy.
- HI and CA are paper based.
- AZ is both paper and electronic based.
- UT: on big projects, all documentation b/w DOT and contractor is electronic. Use ProjectWise to check documents in and transfer electronic documents.
- CO: Using a mix of tools. Using SiteManager. ProjectWise is in early implementation. Paper documentation is still on hand.
- CA: still paper based but trying to develop a customized system that will roll out next summer.
- CFL: use EBACS
- There is a lot of double entry of data; something more seamless makes it a more efficient process.
- FL: Allows consultant to access their systems, but not locals or contractors.
- TX: Use SiteManager. Spreadsheets pull data from SiteManager, and these spreadsheets will be shared with anyone.
- NV: Using voting feature in Outlook.
- UT and NV: Be careful, vendors will build whatever you want but it costs money.
- CO Challenge: issue with electronic signatures is with the State statute.
- AZ: document process in case there is staff turnover; need to know what predecessor did.
- TX: Allows faxed signatures. Try to get around the constant printing, signing, scanning and sending to the next person for their signature. PDF has helped a lot with this.
- Digital Terrain Modeling and Automated Machine Control topic...
- NV: Contractors are starting to ask more for digital terrain models. Contractor used machine control for grading.

- AZ: Post award, will provide DTM with disclaimer.
- UT: Developed a disclaimer and will hand over digital terrain model after bid.
- CA: Does the same thing as UT.
- Both NV and CA are heading towards providing the DTMs before bidding.
- CTR: Would love to have DTM information (even with disclaimer) well ahead of bid time.
- Need QC spec and inspection spec from CFL. Gene Dodd.
- FL: Uses a rover instead of surveyors.
- NV: used LiDAR on I-580 project.
- CA: has a project that used modeling that had some time elements incorporated. (4D)

3.7.2 Challenges

Several common themes emerged from the discussion on challenges, as outlined in the following bulleted list.

- Integration of different systems.
- Systems are more tailored to the vertical industry.

3.7.3 Actions Needed

Agencies discussed actions needed to further implementation of practices related to this topic.

- Get disclaimer language from States that give out the DTM.
- Be flexible, document the process.

4 Appendix B – Southwest CPN Peer Exchange Agenda

Day 1 – Wednesday, November 14		Chris Schneider, FHWA (Moderator)
Time	Topic	Presenters / Facilitators
7:00am – 8:00am	Continental Breakfast	
8:00am – 8:30am	Welcoming Remarks	Randy Park, Utah DOT, Project Development Director Butch Waidelich, FHWA, Director Field Services West Arlene Kocher, FHWA-Utah, Assistant Division Administrator
8:30am – 8:45am	Self Introductions	All Participants
8:45am – 9:30am	<ul style="list-style-type: none"> How to Successfully Build Two Mega-Projects at the Same Time 	Bryan Adams, Todd Jensen, and Teri Newell, Utah DOT
9:30am – 10:00am	<ul style="list-style-type: none"> Summary of PI Tool Analysis & Results Peer Exchange Overview 	Tim Luttrell, SAIC Chris Schneider, FHWA
10:00am – 10:15am	Break	
10:15am – 10:45am	<ul style="list-style-type: none"> Exchange Topic #1: Determining Staffing Levels on a Project Determining Staffing Levels to Support Construction 	Roxana Garcia-Zinsmeyer, Texas DOT
10:45am – 11:45am	Participant Roundtable Discussion of Exchange Topic #1	Facilitator – Rob Wight, Utah DOT
11:45am – 1:00pm	Lunch	
1:00pm – 1:30pm	Exchange Topic #2: Establishing Qualifications for Contractors <ul style="list-style-type: none"> Florida DOT’s Contractor Evaluation System 	David Sadler, Florida DOT
1:30pm – 2:30pm	Participant Roundtable Discussion of Exchange Topic #2	Facilitators – John Eddy, Colorado DOT & Randy Jensen, FHWA Colorado
2:30pm – 2:45pm	Break	
2:45pm – 3:15pm	Exchange Topic #3: Assessing Inspection Levels of Effort with Risk Based Processes <ul style="list-style-type: none"> Arizona DOT’s Quantlist System 	Julio Alvarado, Arizona DOT

Day 1 – Wednesday, November 14		Chris Schneider, FHWA (Moderator)
Time	Topic	Presenters / Facilitators
3:15pm – 4:15pm	Participant Roundtable Discussion of Exchange Topic #3	Facilitator – David Sadler, Florida DOT
4:15pm – 4:30pm	Discussion on Takeaways for Implementation	Dean Testa, Applied Pavement Technology
4:30pm	Adjourn	
Dinner on your own – Options from FHWA Utah Division		

Day 2 – Thursday, November 15		David Unkefer, FHWA (Moderator)
Time	Topic	Presenters / Facilitators
7:00am – 8:00am	Continental Breakfast	
8:00am – 8:15am	Recap of Day 1 Discussion – Themes and Key Takeaways	Dean Testa, Applied Pavement Technology
8:15am – 8:45am	Exchange Topic #4: Developing and Tracking Meaningful Performance Measures <ul style="list-style-type: none"> • Caltrans Division of Construction Performance Measures 	Scott Jarvis, Caltrans
8:45am – 9:45am	Participant Roundtable Discussion of Exchange Topic #4	Facilitator – Julio Alvarado, Arizona DOT
9:45am – 10:00am	Break	
10:00am – 11:30am	Discussion on Other Regional Priorities (any topic)	Facilitator - Scott Jarvis, Caltrans
11:30am – 12:45pm	Lunch	

Time	Topic	Presenters / Facilitators
12:45pm – 1:15pm	Exchange Topic #5: Implementing the Digital Jobsite <ul style="list-style-type: none"> Utah DOT’s Approach to Digital Jobsite Implementation 	Michelle Page, Utah DOT
1:15pm – 2:15pm	Participant Roundtable Discussion of Exchange Topic #5	Facilitator – Jeff Shapiro, Nevada DOT
2:15pm – 2:30pm	Break	
2:30pm – 3:15pm	Discussion on Takeaways for Implementation	Dean Testa, Applied Pavement Technology
3:15pm – 3:30pm	Closing Remarks, Feedback on Peer Exchange, and Next Steps	Bryan Adams, Utah DOT David Unkefer, FHWA
3:30pm	Adjourn	



5 Appendix C – Southwest CPN Peer Exchange Roster

Agency/Organization	Name	Position	Email Address
State Departments of Transportation			
Arizona DOT	Julio Alvarado	Assistant State Engineer for Construction	jalvarado@azdot.gov
Caltrans	Scott Jarvis	Assistant Chief, Division of Construction	scott_jarvis@dot.ca.gov
Colorado DOT	John Eddy	Branch Manager - Contracts and Market Analysis	john.eddy@dot.state.co.us
Colorado DOT	Miranda Lange	Area Engineer	miranda.lange@dot.state.co.us
Florida DOT	David Sadler	Director, Office of Construction	david.sadler@dot.state.fl.us
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Nevada DOT	Sharon Foerschler	Assistant Construction Engineer	sfoerschler@dot.state.nv.us
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New Mexico DOT	Aaron Chavarria	Resident Engineer - D1	Aaron.Chavarria@state.nm.us
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Utah DOT	Bryan Adams	Construction and Materials Director	BRYANADAMS@utah.gov
Utah DOT	Todd Jensen	I-15 Core Project Director	toddjensen@utah.gov
Utah DOT	Teri Newell	Mountain View Corridor Project Director	tnewell@utah.gov
Utah DOT	Michelle Page	Innovative Contracting & Project Controls Manager	michellepage@utah.gov
Utah DOT	Randy Park	Project Development Director	rpark@utah.gov
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FHWA			
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FHWA Headquarters	Chris Schneider	C&SP Engineer	christopher.schneider@dot.gov
FHWA Resource Center	David Unkefer	Construction & Project Management Engineer	david.unkefer@dot.gov
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FHWA-CFLHD	Kevin R. Black	Highway Construction Manager	KevinR.Black@dot.gov
FHWA-CFLHD	Gene Dodd	Construction Operations Engineer	gene.dodd@dot.gov
FHWA-Arizona Division	Aryan Lirange	Area Engineer / Bridge Engineer	aryan.lirange@dot.gov
FHWA-California Division	Steve Pyburn	Senior Transportation Engineer	steve.pyburn@dot.gov
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FHWA-Utah Division	Arlene Kocher	Assistant Division Administrator	Arlene.Kocher@dot.gov
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FHWA-Utah Division	John Haynes	Research & Innovative Program Manager	John.haynes@dot.gov
Contractors/Consultants			
Applied Pavement Technology	Dean Testa	Consultant	dean@dmtenterprises.net
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