



e-Construction

PEER-TO-PEER EXCHANGE

Summary Report



Missouri Department of Transportation and
Colorado Department of Transportation

April 5-6, 2016
Kansas City, MO



U.S. Department of Transportation
Federal Highway Administration

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1. Background

The Missouri Department of Transportation (MoDOT) hosted a peer exchange with the Colorado Department of Transportation (CDOT) in Kansas City, Missouri, on April 5-6, 2016. The focus of the peer exchange is e-Construction, which is defined as paperless construction administration delivery processes that include electronic submission of all construction documentation by all stakeholders, electronic document routing/approvals (e-signatures and digital signatures), and digital management of all construction documentation in a secure environment that allows distribution to all authorized project stakeholders through mobile devices. The event was sponsored by the Federal Highway Administration (FHWA), and representatives from FHWA Headquarters and each participating State's FHWA Division Office also participated in the event.

The morning sessions on the first day (see Appendix A for the full agenda) served as a preface to the peer exchange and allowed for personal introductions, along with background information on each State's construction program and e-Construction activities. The afternoon of the first day consisted of discussion sessions on technologies and systems in use in Missouri, including a detailed demonstration of SiteManager and custom reporting processes. MoDOT also demonstrated and discussed integration of construction information into ProjectWise, a software application already extensively used during the design phase of projects. In the future, MoDOT is working toward full implementation of a SharePoint project collaboration system for similar information storage processes. The first day adjourned after a group discussion on funding sources for e-Construction along with a presentation and group discussion on Information Technology (IT) security. The morning of the second day consisted of additional discussion sessions on e-Construction field devices—with a focus on both the iPad and Windows-based tablets for inspection and maintenance activities. The peer exchange concluded with a demonstration and discussion session on digital signatures, along with summary discussion on next steps, action items, and follow-up activities.

The event also included a presentation and discussion session on a current FHWA project to deploy mobile devices in five FHWA Division Offices, including Florida, Iowa, Michigan, Texas, and Utah. The purpose of the pilot project is to assist FHWA engineers and inspectors by enhancing e-Construction efficiencies and increasing access to real-time data in the field. The pilot project is expanding to additional States in 2016.

The Peer Exchange is the sixth in a series designed to assist States with implementation while allowing peers to network and share information across State departments of transportation in a relatively small group setting. The list of attendees (representing construction and IT personnel), along with contact information for each, is provided as an appendix to this document to promote further networking among participants.

This report includes a summary of key findings from the event, links to relevant documents, and the full notes from the peer exchange discussions.

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2. e-Construction Implementation – Key Peer Exchange Findings

The peer exchange produced several relevant and practical findings identified through group roundtable discussions. The following sections outline the items that were highlighted by the group as next steps, implementation ideas, document exchanges, or focus areas—all of which are designed to assist with future implementation within the States’ e-Construction programs. Where available, Web site links are provided for some of the practices currently in use by the agencies. MoDOT and CDOT also shared some documents by email that are not publically available on the internet.

To further enhance project efficiencies through e-Construction, **CDOT is implementing a 3D model data specification** for use by contractors on projects within the State. CDOT also has tested **use of digital signatures for documentation and approvals** on past projects, and is working to develop a standard process for application of digital signatures and workflow approvals.

Link to Colorado DOT pilot project **specification for use of digital terrain models** for automated machine guidance: <https://www.codot.gov/business/designsupport/2011-construction-specifications/2011-Specs/pilot-project-special-provisions/625gpsrts.doc/view>

Link to CDOT Instructions for Creating a Digital Signature:
<https://www.codot.gov/library/adobe-digital-signature-creation>

Link to MoDOT Digital Signature Quick Reference Guide:
http://www.modot.org/business/contractor_resources/Quality_Management/Digital_Signature_for_Adobe_Pro_10_Contractors.docx

MoDOT developed an electronic Engineering Policy Guide (EPG) and no longer prints standards and specifications for use on projects. MoDOT also published **standard plans formatted for mobile devices** in 2009.

Link to MoDOT EPG, 2011 Specification Book for Highway Construction, and Standard Plans:
http://epg.modot.org/index.php?title=Main_Page
http://www.modot.org/business/standards_and_specs/highwayspecs.htm
http://www.modot.org/business/standards_and_specs/standardplans.htm

Mobile devices have shown cost savings for inspection and maintenance activities by reducing the time needed to document activities. CDOT is currently evaluating the iPad for field use, and MoDOT has piloted the iPad and also a Windows-based tablet. Additionally, MoDOT provide devices to employees and also has a stipend program for personal devices used for business purposes. Mobile Device Management (MDM) is an industry term for the administration of mobile devices, and software is available to provide for security for devices. Airwatch is one tool that can be used to disable a device or erase necessary information if lost or stolen. MoDOT has disabled the wipe feature for the entire device, ensuring that users can retain necessary information on personal devices while providing for an appropriate level of security for business information.

Link to MoDOT “One Phone” Program, including frequently asked questions:
<http://asis.transportation.org/Documents/Cellular%20Stipend.pdf>

Link to Washington State research study on the benefits of using tablet devices for inspection:
<http://www.wsdot.wa.gov/Research/Reports/800/840.2.htm>

Link to FHWA e-Construction Mobile Device Pilot Interim Report:
https://www.fhwa.dot.gov/construction/econstruction/do_pilot_interim.pdf

Link to Airwatch mobile device application management tool:
<http://www.air-watch.com/>

Link to SharePlus software for use of SharePoint on mobile devices:
<http://www.infragistics.com/enterprise-solutions/enterprise-mobility/shareplus>

Participants acknowledged that resources are needed to **ensure minimum competence across the large number of software tools** currently available for e-Construction. Additionally, participants agree that **what works for one DOT may not work for others** (e.g. specific software tools, outsourcing of construction inspection, in-house forces, ratios, etc.). CDOT offers training videos to users, and these videos are housed within the ProjectWise storage and collaboration tool. CDOT also obtains contractor and industry input into software programs prior to mainstreaming their use across the department. Participants also discussed funding sources for e-Construction, including federal Grant programs.

Links to Grant and State Transportation Innovation Council funding sources:
<http://www.fhwa.dot.gov/accelerating/grants/index.cfm>
<http://www.fhwa.dot.gov/stic/>

Design-build is a method of project delivery that combines design and construction into one single contract, potentially awarded as low-bid or best-value. Management of design-build projects differs from traditional design-bid-build projects, and **CDOT developed and shared a white paper on special considerations for software tools used for managing documentation and approvals for design-build contracts.**

MoDOT developed a software tool for converting Excel-based inputs from contractors and MoDOT personnel into data that is imported into an Oracle database. The system checks network drives for changes to Excel files and automatically imports the data. MoDOT shared their process with CDOT for both E20 – Excel to Oracle, and CRE2O – Contractor Excel to Oracle.

MoDOT developed an app for location referencing titled Mobile Log Finder. By saving the link on a phone, users can find log miles in the field. MoDOT's Information Technology group developed it, and external access allows contractors to reference their location and report work based off of MoDOT's log mile system.

Link to Mobile Log Finder App: www6.modot.mo.gov/mobilelogfinder

3. Peer Exchange Discussion Notes

This section provides additional notes following the organization of the agenda. Question and answer sessions followed each presentation and demonstration (labeled “Q” and “A” in the notes). As noted above, 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 attendee.

Jennifer Harper kicked-off the peer exchange and provided opening remarks for MoDOT and provided a safety briefing. Tim Kell with Illinois DOT provided a background on the selection of Missouri and the practices of interest including related contractors that do work in both States. IT staff is interested in how SiteManager is administered and how MoDOT uses mobile devices.

3.1 Exploring State Presentation – Colorado DOT e-Construction Status and Plans

Mark Straub with CDOT presented on current practices in Colorado and the focus on e-Construction implementation. The State of Colorado has a diverse landscape of level terrain in the east and mountainous terrain in the west, making delivery of highway construction projects challenging. CDOT as a department is decentralized, with a Resident Engineer that supervises each engineering unit. A headquarters unit is designated as “project support” and assists with consistent implementation across the State. For e-Construction, CDOT’s plan is to go paperless, while documentation for construction program implementation still consists of paper documentation and ink signatures. The Department also uses SiteManager to generate some documents and metrics including weekly contract time count, daily work reports, and summary of payments to a bid item. ProjectWise is also used for storing and organizing design documentation. CDOT also uses a Laboratory Management Information System (LIMS) which is the SiteManager Materials Management Module.

In 2016, CDOT issued a specification that outlines the process for providing 3D modeling data to contractors for automated machine guidance and automated machine control. The resident engineer decides if candidate projects will experience value from 3D modeling data prior to implementation, such as projects with extensive earthwork. The first phase of implementation provided 3D model data during the bidding process. Contractors and consultants have also embraced the implementation of e-Construction for cost and time savings and greater efficiencies in delivery. For MoDOT, contractors drove much of the initiative and transparency is also a major benefit from implementation.

CDOT Employees also use laptops and some use smart phones (with appropriate business case such as the need for broad area email access and file transfer) – no tablets have been used to date. CDOT has funding for evaluation of the iPad for application in construction. CDOT will also implement a policy on use of mobile devices where the DOT provides a monthly stipend to individuals that purchase the device. FHWA has had issues with the iPad in the tablet device pilot project in implementing digital signatures linked to the personal identity verification (PIV) card. There is no provision for use of the PIV card on the iPad. Electronic Professional Engineer (PE) seals are not allowed within CDOT, while consultants do use electronic PE seals.

Statewide policy and law allow for use of digital signatures in Colorado. In Missouri, some stakeholders require a wet ink signature on some documents (noted by research section). CDOT is moving forward with an Adobe electronic signature application for e-Construction. FHWA provides reimbursement to States through electronic means and provides signatures on those documents electronically.

For document management systems, CDOT has no policy mandating the location of these documents. Region personnel use ProjectWise, SharePoint, network drives, and external drives. CDOT has a project delivery advisory committee that recently discussed mandating one solution for all documents and collaboration correspondence, and the future will include a requirement for use of ProjectWise as the single source for design and construction documentation. Access to ProjectWise is provided by the CDOT Office of Information Technology and requires a user ID and password.

Participants also discussed a new initiative named RoadX, which is a partnership between CDOT and private industry to look at how to optimize the efficiency of the transportation network.

Q: Does CDOT still handle materials certifications and daily diaries using paper?

A: CDOT has policies set at the headquarters level. A spreadsheet tool was originally developed to capture field inspection information, and SiteManager allows users to input data for quantification and payment.

Q: When State auditors ask for information what is provided to them?

A: CDOT is implementing a Civil Rights/Labor Management Tool that assists with documentation. State auditors review SiteManager and also paper copies of information from the Finals Engineer. Resident Engineers at each office maintain paperwork for seven years. Several States have noted costs associated with paperwork archive facilities and hard cost savings from e-Construction replacing paper archives. Another challenge with electronic documentation is file compatibility to view files in the future.

Q: Does CDOT require contractors to have wireless connectivity on the project sites?

A: No, but the DOT allows autonomy across regions to implement this. Some contractors apply technology such as smart phones and tablets to major projects, while CDOT does not provide a requirement for this.

CDOT allow districts to decide on whether to work with the survey unit to establish requirements for use of preliminary survey data in the design model where the as-builts are developed in electronic format and submitted based on this data.

3.2 Host State Presentation – MoDOT e-Construction Overview

Sarah Kleinschmit and Jeremy Kampeter with MoDOT provided an overview presentation on e-Construction practices in Missouri. MoDOT has a six person transportation commission, with director, chief engineer, and assistant chief engineer roles reporting to the commission. MoDOT also has several divisions that are responsible for providing support to seven districts across the State. Industry also helped drive much of the innovation that is being applied by MoDOT in e-Construction. MoDOT and CDOT both provide electronic plans for use by contractors during the bidding process (e-bidding).

MoDOT is using SiteManager, ProjectWise and SharePoint for online document storage and collaboration, and also uses mobile devices in the field as well as Bluebeam software for as-built plans. MoDOT is moving to a collaboration site using SharePoint as the document management system. MoDOT has also allowed users to select a tablet device during computer refresh cycles for employees.

Q: Did MoDOT have staffed print shops that had resistance to electronic plans?

A: In Missouri it was less about resistance and more about fear of change. Much of what was being printed was also getting recycled soon after use, confirming the benefit of using electronic documents only. Print shop activities also continued – producing flyers, public meeting handouts, etc. All standards are electronic.

Q: When you use an electronic plan, is it a record set with or without signature?

A: It is a plan set signed electronically. CDOT does not have signed versions until contract is awarded, and a signed and sealed plan is provided in paper format.

Q: Do you share paper PS&E packages with the FHWA Division Office?

A: They are all shared electronically, and FHWA is able to review plans electronically.

Q: Why did you decide on Bluebeam? Have you used imarkup?

A: Bluebeam is part of a pilot test of the software – CAD section was noticing that inspectors needed to be retrained on MicroStation because they may not use it frequently. Bluebeam turned out to be lower cost than some alternatives for plan mark-ups.

MoDOT is in production with SiteManager Construction and Materials, but not the LIMS module. MoDOT also uses AASHTOWare Preconstruction in web-based format.

Jeremy Kampeter, the Missouri Construction Management Systems Administrator, provided a demonstration of the SiteManager application. MoDOT manages approximately \$800 million annually in construction funding over about 420 projects awarded by contract. CDOT is approximately the same in annual construction dollar amount but spread over 150 projects. CDOT is considering providing the engineers estimate to contractors to encourage more contractors to bid on projects.

With implementation of SiteManager, MoDOT has not experienced any unplanned downtime in 17 years of use. It was implemented in 1999 in anticipation of the potential year 2000 computer issues. Contractors do not currently have access to SiteManager. MoDOT does not have a significant consultant inspector work force in place. CDOT allows outside entity access (data such as from materials testing, etc.) through Virtual Private Network (VPN) access. Most CDOT inspectors (85%) are consultants, and 15% of project engineers are on consultant contracts.

MoDOT produces a draft payment estimate, where a lead inspector runs an estimate. SiteManager references pay items and calculates a value for the estimate. Once the Resident Engineer has reviewed the estimate, the contractor can verify if an item is missed or an adjustment is needed. This process is implemented electronically by email with PDF documents. The future process is to post documents to SharePoint where contractors can review it electronically. MoDOT is required to pay contractors within 30 days of completion of work. Some CDOT reporting templates for materials do not function timely enough to encourage greater use.

CDOT discussed payroll management systems with contractors, and their input provided guidance to CDOT in selecting software for implementation. Civil Rights and Labor (CRL), LCPTracker, and Business to Government (B2GNOW) were all considered.

Q: Does MoDOT use a third party for Quality Assurance (QA) testing?

A: Only if there is a dispute over the results. MoDOT has an extensive laboratory, but some limited procurements for outside testing sources have been used in the past.

Q: Has MoDOT looked at Mobile Inspector?

A: Excel to Oracle (E2O) materials templates are used, allowing for input into Excel with automated data conversion into an Oracle database. MoDOT is looking to Mobile Inspector to provide a similar solution that is not device specific.

Q: What does MoDOT use for design-built projects?

A: MoDOT originally implemented a different solution than SiteManager on a 2006 design-build project. The last design-build project was implemented through SiteManager. CDOT developed a white paper on challenges with documentation management for design-build projects, including application of SiteManager.

MoDOT does not use retainage for any projects.

There is a standard network drive with a folder structure for additional electronic forms for anything not included in SiteManager. SharePoint is planned for July 2016 to share all project documentation – this will become the formal MoDOT project collaboration tool. FHWA has a connection to the network drive for access to prepare for field inspections. Digital signatures are also applied to change orders through documents on the network drive, and this process has significantly reduced the number of days necessary for approval of change orders including FHWA approvals. FHWA has the ability to approve documents using a toggle within SiteManager, and the digital signature process is also applied. FHWA Missouri Division representatives log in as a MoDOT employee to gain access.

MoDOT is using tablet devices in the field with hotspots – some inspectors have MoDOT-provided devices such as cell phones, while personal device users are provided with a stipend on a monthly basis. The Dell Venue is the tablet in use by MoDOT. They have tested several types of devices and operating platforms.

3.3 Demonstration of Host State e-Construction Technologies and Systems (SiteManager)

Jeremy Kampeter continued his presentation and demonstration specific to the SiteManager software and custom reporting. E2O is Excel to Oracle which takes a materials template and data input in excel and reads the files posted on the shared drive and adds data to the database. The system reviews files every five minutes to check for new data.

CRE2O is Contractor Reported Excel to Oracle – a similar system that allows contractors to edit formatted spreadsheet templates that can also be filed and data pulled into the database. Inspectors connect via VPN and upload daily work reports in Missouri (internal MoDOT inspectors). MoDOT also uses a product called COGNOS that is an agency wide reporting web-based third party application.

Consultant designers can use their own software for development based on MoDOT CAD standards. Once the project is completed, consultants provide electronic deliverable files to MoDOT who then make those available for bid letting. They also provide signed and sealed plans in electronic format which are then housed in ProjectWise.

Funding discussions included topics such as State Transportation Innovation Councils (STIC) and Surface Transportation Program (STP) Grant money for project management systems and other e-Construction innovations and technology applications.

3.4 Collaborative Project Sites – ProjectWise and SharePoint Demonstrations

Brian Burger and James Pflum with MoDOT provided a demonstration of SharePoint. Historically, contractors shared information by email on certifications, material information, etc. and when employees left MoDOT the email information was no longer accessible by others. The accounts provided to prime contractors are assigned individually, and there is no cost associated with contractor access. The prime

contractor may assign access to materials suppliers and others as needed, and the process is outlined early on in the preconstruction meeting. MoDOT employees have read-only access to information and FHWA Missouri Division Office personnel can also access MoDOT files. A group from various offices within MoDOT met to discuss the original design and folder structure for the SharePoint site.

Q: How does your site function on the mobile devices?

A: For the external site, the iPads work well but there are issues in access from the iPhone due to screen size.

Q: Can you generate status reports or dashboard information?

A: It has some limited functionality to track metrics based on all documents uploaded and for tracking progress. ProjectWise can be configured to report on this type of information as well.

Q: What types of software tools are used to generate notes?

A: Adobe Pro, PDF Expert, Harmon.ie app for SharePoint is used.

Q: What software does MoDOT use for digital signatures?

A: Adobe Pro is the primary tool, and a pilot of Bluebeam Revu also allows digital signatures.

Chris Schwandtner, MoDOT's ProjectWise administrator, presented on workflow processes for document approvals and storage. MoDOT began a project in early 2006 to implement the ProjectWise electronic file system. Part of the design included automatically created PDF files that are sealed electronically in the Adobe software. MoDOT reorganized from 10 districts to seven districts, and ProjectWise CAD file storage systems allowed for simple transition during the reorganization. MoDOT manages several million files with nearly two terabytes of data within ProjectWise, and each district has their own ProjectWise server.

Users of ProjectWise can request that a PDF file be generated (a custom application titled "Make PDF Request") using Interplot software from Bentley. The engineering policy group created a file naming convention that is used, and if users do not follow the convention the file is rejected. This application allows users to generate a PDF file drawing from multiple drawing file sources, and users can turn layers on and off to create different views.

Seals and signatures are controlled with public/private key encryption, and project managers have control of all files associated with that project. An electronic seal is used for both professional engineer seals and professional land surveyor seals, and the images can be added to the contract plans.

Q: Are the project files accessible to all users within MoDOT?

A: Files are only accessible to individuals that have a license for the client. For CDOT, the agency has a license structure for ProjectWise that allows users to access and view files based on that license.

Q: What would MoDOT recommend in getting people to use ProjectWise?

A: MoDOT previously had an application that operated from the server and users did not have control – transition to ProjectWise allowed for complete electronic implementation and users understood that they had to transition.

Q: Does MoDOT seal plan special provisions?

A: Yes, these are digitally signed and PE sealed special provisions and standard drawings are in use.

3.5 Discussion on IT Security Solutions, Firewalls, and Outside Access

Jim Edwards, District Information Systems Manager for the MoDOT Kansas City District, presented on IT security as related to e-Construction applications. MoDOT has past experiences with virus files that caused issues for the network. Physical issues such as password protection, computer lock policies, and policies for access through unsecure public Wi-Fi networks are all part of IT security. MoDOT blocks access to personal email accounts through the system. MoDOT uses Airwatch on all devices and requires users to have to access the internal network. CDOT uses Mass360 but it is not required on all devices. Mobile Device Management (MDM) applications will often include GPS tracking and mobile erase of all data, which might cause issues for users in applying the application. The MoDOT SharePoint site is operated outside the firewall and has access security to isolate issues and threats. For virtual access to conferences, MoDOT works with the outside entity to provide a Polycom link to videoconference software. MoDOT is planning for bio-metrics such as fingerprints and face recognition for building access security application.

Q: Does MoDOT have any bandwidth issues?

A: No, MoDOT has infrastructure in place to handle all e-Construction applications. Some field offices are connected to the MoDOT network also. MoDOT has also allowed utility resources to be located on the right-of-way in exchange for use of the fiber network.

Q: For CDOT, OIT requires following the Agile methodology – does MoDOT require anything for project management processes?

A: No, users can implement a variety of processes as needed.

Q: Can users install apps on the iPad freely?

A: Users must have admin rights on the iPad to install apps.

3.6 e-Construction Mobile Devices

James Pflum with MoDOT provided a presentation and demonstration on the use of mobile devices. An initial pilot provided eight iPads across the State for inspectors to document how they are used. Windows tablets were purchased also for use after input from the pilot. Users asked the question about what needs to be done and if there is another way to do it. MoDOT is still working on how to handle requests for apps that have costs associated – users test free versions and then provide input and suggestions on broader use. CDOT has a contract with Hewlett Packard for providing devices to employees. MoDOT provides devices and also offers a stipend for use of personal devices for business, and users reimburse MoDOT for any personal use of devices such as phones.

The iPad provides for a simple process in filling out forms. MoDOT converted commonly used Word and Excel documents into PDF fillable forms. The iPad does not allow MicroStation or GEOPAK or SiteManager to run on the iPad. MoDOT uses Windows 7 currently on computers and Windows tablets.

MoDOT is experiencing valuable benefits from the mobile devices. One primary benefit is that the devices allow inspectors to spend more time in the field, and the mobility of the device allows for greater capture of data and information more efficiently. There is also an app for videoconference software currently in use at MoDOT office locations. MoDOT is evaluating access to and use of the iPad-to-iPad video link software.

Web-based AASHTOWare software may provide future benefits to the agencies in accessing information from the tablet devices. Participants also discussed reducing the number of devices, and the potential for

eliminating a phone by adding voice capability to the tablet (based on existing cellular access for the iPad) with a Bluetooth headset.

Consideration should be made for device policies and DOT support to contract device purchase and use.

Q: What other legacy systems do inspectors interact with?

A: Anything flash-driven would have potential issues, MicroStation and GEOPAK also have issues, and Bluebeam may alleviate many of the issues associated with as-built drawing generation. Network drive connectivity is also an issue. The Bid Tabs Pro software tool is also accessed by mobile device users.

Q: How do you handle survey inspection with the mobile devices?

A: MoDOT checks 10% of the staking as a quality assurance process, and that is performed using GPS units and data collectors.

MoDOT has seen an increase in the amount of inspection information captured during field inspections, such as photographs taken using mobile devices. By streamlining the process, the mobile devices are allowing for the capture of enhanced information from the field.

MoDOT has future plans to determine value of devices and apps for use in the field in addition to existing pilots. Use of infrared devices for asphalt inspection that can plug into a phone is a concept that MoDOT plans to consider for future use. Volume of data is directly related to level of effort in data entry, and MoDOT also anticipates benefits from greater data gathering activities from the field (an example is wage interviews and data collection associated with the interview). MoDOT is also evaluating the use of drones for inspection photographs and videos. Contractors are also using drones to capture and document the traffic control layout, as an example.

3.7 Discussion on FHWA Division Office Pilot Program for Tablets

Representatives from FHWA discussed a current pilot project to evaluate use of tablet devices in the FHWA Division Offices. Currently, Florida, Michigan, and Iowa Division Offices are using iPads, and Texas and Utah Division Offices are using the Surface Pro. FHWA has support costs built in to the reported costs of each device, and the Surface Pro is comparable in price to the standard laptop configuration. Participants from FHWA Divisions discussed the addition of Surface Pro devices to the pilot for use in Missouri, as FHWA has expanded the pilot to include Missouri, North Carolina, Pennsylvania, Virginia, and West Virginia. One important discussion point for the FHWA Missouri Division is the connection to SiteManager and how it works from the tablet device. Participants will meet with representatives from Utah and Texas at the user forum to discuss.

3.8 e-Ticketing Challenges and Needs

Currently, MoDOT issues paper tickets for asphalt, concrete, and aggregate which is part of the payment process and schedule. Key stakeholders in the process have discussed potential implementation of e-Ticketing as a concept to make the process paperless. Vehicle weight, tonnage, and combined weight are the outputs that MoDOT wanted to see, but the change to the electronic ticket is a challenge. A contractor in Illinois is implementing a similar system to determine speed of deliveries, delays, and overall efficiencies in the process, and Iowa DOT performed a pilot project using a fleet management tool. Another key consideration is whether trucks are operated by independent vendors or work directly for the contractor. The ticket

includes data on the mix design and also on the material tonnage. One contractor built a system for handling this on their own on the Dallas Fort Worth Connector project for payment by the minute to a subcontractor. Buy-in from the contractor side will be important to leading change in ticketing processes.

3.9 Digital Signatures

Sarah Kleinschmit with MoDOT provided a presentation on digital signature use in Missouri. Contractors are required to obtain a digital signature for the purposes of bidding on MoDOT projects. Contractors must also sign an agreement to digitally sign BidExpress documents. In July 2015, MoDOT mandated digital signatures via the e-Construction Job Special Provision. Certain documentation still needs to be notarized and therefore is not required to be signed digitally. MoDOT decided to be a self-verifying agency as opposed to using a third party verification process.

Contractors are required to submit (export) their digital signature certificate (.fdf file) to a specific email address, and MoDOT currently has 391 active contractor digital signature certificates on file. The process is the same for applying a digital signature through Bluebeam Revu. If a user has digitally signed a document and a change is made, the original validation will be marked as not currently validated. Once workflows are completed, documents are exchanged by email for final digital signatures. MoDOT anticipates placing signed/final documents on the SharePoint site in the future.

MoDOT purchased Bluebeam maintenance for a small annual fee per computer to assist with any issues that arise. This software is being used by inspectors to mark-up final plans in PDF format instead of going back to original CAD files to make changes. MoDOT blocks out original engineering seals with a statement that the as-built should not be considered a certified document in this format. With engineering changes, documents are recreated in the design division and re-sealed. Bluebeam also has options for allowing changes after certification.

CDOT is using PlanGrid software to capture photos, develop punch lists, and generate reports.

Appendix A – e-Construction Peer Exchange Agenda



Colorado/Missouri e-Construction Peer Exchange

600 NE Colbern Rd.
Lee's Summit, MO 64086



Agenda

Day 1 – April 5, 2016

Time	Topic	Presenters / Facilitators
8:00am – 8:15am	Welcoming Remarks and Introductions	Bryan Cawley, FHWA Jennifer Harper, Missouri DOT Mark Straub, Colorado DOT
8:15am – 8:30am	Peer Exchange Background and Overview	Tim Luttrell – Leidos Tom Zagorski – Michael Baker
8:30am – 9:00am	Colorado e-Construction Status and Plans	Mark Straub – CDOT
9:00 am – 10:00 am	Missouri e-Construction Overview	Sarah Kleinschmit & Jeremy Kampeter – MoDOT
10:00am – 10:15am	Break	
10:15am – 11:45am	Demonstration of Host State e-Construction Technologies and Systems – SiteManager	Jeremy Kampeter – MoDOT
11:45am – 1:00pm	Lunch	
1:00pm – 2:30pm	Collaborative Project Sites – ProjectWise and SharePoint Demonstrations	Brian Burger, James Pflum, and Christian Schwandtner – MoDOT
2:30pm – 2:45pm	Break	
2:45pm – 3:45pm	Discussion on IT Security Solutions, Firewalls, and Outside Access	Jim Edwards – MoDOT
3:45pm – 4:15pm	Discussion on Day 1 Takeaways for Implementation	Tom Zagorski – Michael Baker International Tim Luttrell – Leidos
4:15pm – 4:30pm	Preview of Day 2 Agenda Items	Tom Zagorski – Michael Baker International
4:30pm	Adjourn	

Dinner on your own

Day 2 – April 6, 2016

Time	Topic	Presenters / Facilitators
8:00am – 8:15am	Recap of Day 1 Discussion Themes	Tom Zagorski – Michael Baker International
8:15am – 10:30am	Technical Exchange Topic #2: Field Review of e-Construction Mobile Devices	James Pflum – MoDOT
10:30am – 11:00am	Discussion on FHWA Division Office Pilot Program for Tablets	FHWA/All
11:00am – 11:30am	Discussion on Benefits Information and Funding Sources for e-Construction	All
11:30am – 12:45pm	Lunch	
12:45pm – 1:00pm	Discussion on Ideas for Implementation of e-Ticketing for Material Deliveries	All
1:00pm – 2:00pm	Technical Exchange Topic #3: Digital Signatures	Sarah Kleinschmit – MoDOT
2:00pm – 2:15pm	Discussion on Takeaways for Implementation – Suggestions for CDOT Implementation Plan	Tom Zagorski, Michael Baker International Tim Luttrell, Leidos
2:15pm – 2:30pm	Closing Remarks, Feedback on Peer Exchange, and Next Steps	All
2:30pm	Adjourn	



Appendix B – e-Construction Peer Exchange Roster

Name	Agency	Email Address
Sahar Alola	Colorado DOT	Sahar.Alola@state.co.us
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