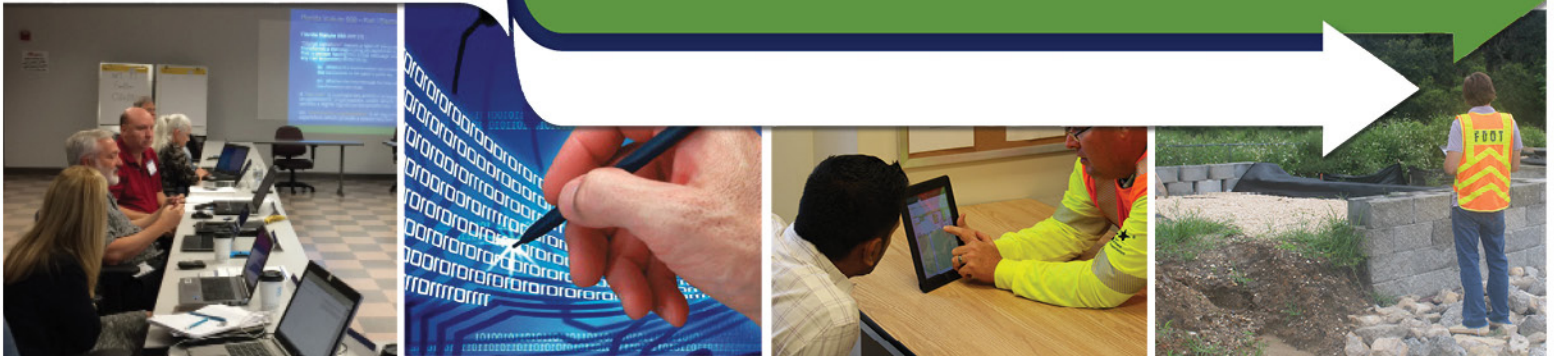




e-Construction

PEER-TO-PEER EXCHANGE

Summary Report



Tennessee DOT, Alabama DOT
Missouri DOT, and Iowa DOT

November 15 – 16, 2016
Nashville, TN



U.S. Department of Transportation
Federal Highway Administration

Table of Contents

1. Background	1
2. e-Construction Implementation – Key Peer Exchange Findings	2
2.1 Tennessee DOT	2
2.2 Alabama DOT	2
2.3 Missouri DOT	2
2.4 Iowa DOT	3
3. Peer Exchange Discussion Notes	6
3.1 Tennessee	6
3.2 Alabama	7
3.3 Missouri	8
3.4 Iowa	8
4. AASHTOWare Discussion and Demonstration – SiteManager / FieldManager and AASHTOWare Project Construction and Materials Conversion.....	10
4.1 Missouri’s AASHTOWare Experience.....	10
5. Document Management and Collaborative Project Sites – ProjectWise, DocExpress, and SharePoint Demonstrations	11
5.1 Iowa’s DocExpress Experience.....	11
5.2 SharePoint	12
6. Alabama’s Construction and Materials Management System	14
7. Discussion on Digital Signatures	15
8. e-Construction Mobile Devices: iPads and Windows Tablets in Missouri and Iowa and the TDOT Pilot Project	16
8.1 Missouri	16
8.2 Iowa.....	17
8.3 Tennessee	18
8.4 Grants and Funding.....	20
9. FHWA Division Office Pilot Program.....	23
10. e-Ticketing Pilot Projects in Iowa.....	24
10.1 Hot Mix Asphalt Pilot.....	24
10.2 Iowa Concrete Pilot.....	25

1. Background

The Tennessee Department of Transportation (Tennessee) hosted a peer exchange with the Iowa Department of Transportation (Iowa) and Missouri Department of Transportation (Missouri) in Nashville, Tennessee, from November 15-16, 2016. The Alabama Department of Transportation (Alabama) also observed the peer exchange to assist with planning topics for a similar, separate event and due to its close proximity. The focus of the peer exchange is e-Construction, a paperless construction administration delivery process that includes electronic submission of all construction documentation by all stakeholders, electronic document routing and approvals (e-signature and/or digital signatures), and digital management of all construction documentation in a secure environment that nonetheless allows for distribution to all authorized project stakeholders through mobile devices. The event was sponsored by the Federal Highway Administration (FHWA).

The session on the first day served as an introduction to the peer exchange and personal introductions, along with background information on each State's construction program and e-Construction activities. The day also consisted of discussion sessions on implementation of document management sites and digital signatures. The morning of the second day consisted of discussions on the use of mobile devices for construction inspection, benefits and lessons learned from the FHWA Division Office pilot program, and information on e-Construction funding sources. The afternoon included discussion on Iowa's pilot projects for e-Ticketing for material deliveries to project sites.

Construction and Information Technology (IT) leaders, field personnel, and engineers from Tennessee, Alabama, Iowa, and Missouri, and FHWA Headquarters and the FHWA Division Office participated in the event. The list of attendees, along with contact information for each, is provided as an appendix to this document.

The Peer Exchange was a successful example of an exploring State hosting an exchange with multiple subject matter expert State participants (Iowa and Missouri) as well as an additional exploring state (Alabama). All participants were vocal that the exchange provided a mutually beneficial forum to see perspectives from multiple states in a single setting.

Participants discussed the important issues and challenges, potential solutions, and e-Construction practices that have proven beneficial to agencies and contractors. Application of e-Construction in the field through portable devices, documentation through project collaboration sites, and the use of digital signatures and workflows were all focus areas of the peer exchange.

This report includes a summary of key findings from the event, along with the full notes from the peer exchange discussions during the State presentations. To promote further networking and information sharing, a roster of participants along with contact information is included in Appendix B.

For more information, please contact:

Bryan Cawley, P.E.
Construction Management Team Leader
Office of Infrastructure, FHWA
202-366-1333
bryan.cawley@dot.gov

Kathryn Weisner, P.E.
Construction & Contract Administration Engineer
FHWA Resource Center
202-823-2267
Kathryn.weisner@dot.gov

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 summarize the status and future directions of the States' e-Construction programs along with links to Web sites.

2.1 Tennessee DOT

Tennessee is looking at this from not just an e-Construction standpoint but also a business standpoint. The IT Group is part of the DOT, and having someone in IT who knows about standard TDOT processes and functions is critical.

The current bidding process is heavily paper-centric. TDOT is using paper plan sets and ink signatures on contracts. Their staff has a long-term attachment to these processes. A big issue they want to address is the printing of plans. Tennessee spent over \$50,000 in FedEx bills alone in just sending out revisions to plan sets. There can be a very measurable return on investment. A helpful resource on return on investment (ROI) is currently being finalized by the Turner Fairbank Highway Research Center, and the report is designed to help agencies and others provide quantification of ROI.

One consideration is that a younger workforce coming in and how they will be expecting paperless systems and embracing extensive use of technology.

Link to TDOT SiteManager Resources including student guides for training on its application:

<http://www.tn.gov/tdot/article/sitemanager>

2.2 Alabama DOT

Alabama recognizes the need to conduct an analysis of business processes. The agency also recognizes the importance of understanding the scope of the effort; you need to have a high-level vision to understand your needs.

The agency has received buy-in from the executive level to make investments in staff resources. The agency's program and development leadership understand the construction (and design) process, which is helpful.

Alabama has also found the agile methodology extremely helpful.

The agency appreciates the opportunity to hear various perspectives because it has defined goals moving forward and needs to prioritize its objectives and work items.

Link to ALDOT points of contact for the Construction and Materials Management System (CAMMS):

<http://www.dot.state.al.us/conweb/doc/Environment/SM%20Contacts.pdf>

2.3 Missouri DOT

Missouri feels that, based on the information shared, they are heading in the right direction. The agency is planning to look into ESRI, sample tracking, barcodes, inventory systems, and apps. MoDOT has extensive e-Construction resources that can benefit other agencies interested in implementation, as shown in the following sections.

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** (e-pubs) 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

Participants discussed the legal challenges with **implementation of digital signatures** and also the need to obtain industry input to the process, including industry organizations such as contractor and professional engineering associations. MoDOT uses Adobe signatures and also signs and seals plans electronically, and uses Bluebeam Revu's digital signature capabilities on as-built drawings. FHWA has also linked several Federal resources on use of digital and electronic signatures to the e-Construction site.

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

Link to Bluebeam Revu for the iPad:

<http://www.bluebeam.com/us/products/revu/ipad.asp>

Link to Federal publications on use of digital signatures and electronic signatures:

<https://www.fhwa.dot.gov/construction/econstruction/library.cfm>

Mobile devices have shown cost savings for inspection and maintenance activities by reducing the time needed to document activities. MoDOT has piloted the iPad and also a Windows-based tablet. Additionally, MoDOT provides devices to employees and also has a stipend program for personal devices used for business purposes. FHWA is also piloting use of tablet devices for inspection activities in Florida, Iowa, Michigan, Missouri, North Carolina, Pennsylvania, Texas, and Utah (iPad and Surface Pro).

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 SharePlus software for use of SharePoint on mobile devices:

<http://www.infragistics.com/enterprise-solutions/enterprise-mobility/shareplus>

2.4 Iowa DOT

IADOT piloted an electronic ticketing and materials tracking solution in 2015. The system is designed to tag and track trucks from their source to the material delivery location using Global Positioning System (GPS) technology and proprietary software. IADOT sees great benefit (such as improved inspector

efficiencies and enhanced safety) in future uses of this system with full integration of weight scale information for asphalt and Portland cement concrete (PCC).

Link to IADOT blog site and post on e-ticketing for asphalt:

<http://www.transportationmatters.iowadot.gov/2015/12/eticketing-show-promise-of-speeding-process-and-improving-accuracy-at-asphalt-job-sites.html>

State policies vary in their use of a **standard set of applications (apps) and the associated protocols for users in downloading and testing new apps**. Many States allow users to download and test new work-related apps, with a feedback mechanism for pros and cons and suggestions for future use. This is an important concept, as new technologies are rapidly changing and new inspectors benefit from a shortened learning curve on mobile device use. Participants also made a recommendation for AASHTO or similar entity to organize all assessment information on software and applications or host a site where users can provide input to assist others with selecting the best tools to fit their needs.

Link to IADOT external ArcGIS Online for Organizations (AGOL) applications:

<http://www.iowadot.gov/gis/applications.html>

Link to Fulcrum app for mobile data collection and core sample position logging:

<http://www.fulcrumapp.com/>

Link to IADOT snow plow tracking application:

<http://iowadot.maps.arcgis.com/apps/SocialMedia/index.html?appid=cb8b98296a3444a09b49e102ad57bfe8>

Iowa implemented a Saximeter-type app for calculating the height of the stroke and the number of strokes per minute, along with blows per minute. This app has a cost of less than \$15 and can be found on the Google Play Store and iTunes by searching for “pile driving.”

Standard software tools are developed and/or procured for use by State DOTs in managing construction programs electronically. IADOT shared its experiences with developing and integrating document management systems such as **DocExpress**.

Link to DocExpress case study on IADOT’s use of the software:

https://www.infotechfl.com/downloads/docexpress/doc_express_case_study.pdf

Mobile devices take a variety of forms. IADOT piloted iPads in the field, and also tested the Microsoft Surface Pro for inspection and maintenance documentation. For field inspection, IADOT chose the iPad due to simplicity of apps and geospatial orientation. Field inspectors have limited engagement with IADOT mainframe legacy software applications and database systems from mobile devices. IADOT also uses an app called Airwatch to manage software pushed out to all DOT devices, and recent software versions are compatible with various operating systems. Some other agencies use iPads and some use Microsoft Windows-based tablets. Additionally, iPads have built-in cellular technology, while the Surface Pro requires a hotspot for wireless access. Both have a GPS receiver, but the Surface Pro requires a special configuration to use GPS for positioning and location data (added to photographs, etc.).

Links to IADOT Construction Electronic Reference Libraries:

<http://www.iowadot.gov/erl/index.html>

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 Airwatch mobile device application management tool:

<http://www.air-watch.com/>

Software-as-a-Service (SAS) is becoming more common as e-Construction systems may be subscription based with data housed in the Cloud as opposed to a one-time purchase model with future upgrades. Additionally, many State DOTs opt to use third-party document management hosting in the Cloud to avoid issues with internal DOT system access while still being able to archive files on internal systems inside the firewall once projects are completed. An annual contract subscription can provide benefits for ongoing projects in helping agencies more easily manage stakeholder access to all e-Construction documentation and data.

Link to FHWA standards for approved Cloud-service providers:

<http://www.fedramp.gov/>

IADOT is using PDF Expert to provide comments on documents electronically and to support as-built documentation. Inspectors and others from IADOT stated that this e-Construction tool is user friendly with minimal learning curve as opposed to other drawing tools that are also commercially available. This tool was tested with success on the iPad.

Link to more information on the PDF Expert software application:

<https://readdle.com//products/pdfexpert5/>

3. Peer Exchange Discussion Notes

This section provides additional notes following the organization of the agenda. 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.

3.1 Tennessee

Tennessee is looking at this from not just an e-Construction standpoint but also a business standpoint.

The IT Group is part of the DOT. Tennessee has approximately 120 IT staff. About half work on help desk and support. The other half work on development.

In terms of the e-Construction Road Map, Tennessee realizes they can't get better until they review and adjust their business processes.

- 55% is putting the right people in the right place
- 37% adjusting the processes

The current bidding process is heavily paper-centric. They are using paper plan sets and ink signatures on contracts. They began using SiteManager in 2007. In terms of cost, the salaries of 10 inspectors + young engineers, assuming two trips per week for data uploads, totaled approximately \$135,000.

In 2012, the agency changed the business model to bring more CEI staff back to Tennessee. They were about 75% consultant CEIs, but have since hired inspectors and are internally training them. There are 36 offices with 20 people per office.

The agency oversees about \$1 billion per year in construction and employs 3600 employees statewide, of which about half are maintenance and about one-third are construction staff. The rest is design/planning staff. The central office is more “corporate” and includes some planning & some environmental staff.

The state has 95 Counties with approximately 25 counties per region. Each region oversees everything for the 25 counties. All contract and construction administration is handled by the regions. They advertise 4 weeks prior to letting.

In terms of tools, the agency has chosen the Dell Latitude 7275 for field use.

Going forward, a big issue Tennessee wants to address is the printing of plans. The agency spent more than \$50,000 in FedEx shipping alone just for sending out revisions to plan sets.

Tennessee wants to create access for:

- Contractors so they can easily access contract documents.
 - Ideally there would be separate portals for contractors to have their own area to log in.
- Field staff for real-time access to contract docs, specs, and standards while out of the office.

Tennessee’s top priorities include:

- Hardware
- Standards
- Digital Signatures
- Field Access
- Electronic Plan Sets for Bid

3.2 Alabama

Alabama just let the biggest project in their history:

- Estimate: \$297-\$357 M
- Low bid was \$435 M, #2 was \$507 M.
- Low bid was thrown out due to issues.

The state normally lets between \$700 and \$800 million per year on construction, but is in year 4 of a 5-year bond program worth over \$1 billion for city/county projects called ATRIP. These are additional projects to our annual program. The agency just went from 9 Divisions to 5 Regions with 10 Areas and 41 Districts in an effort to decentralize.

There are currently 603 field inspectors. They had 417 in-house inspectors and 186 Consultant CEI, but add another 100 to account for the county and local field staff.

In terms of how the agency does business, major change orders come to the central office. Anything valued at more than \$100,000 comes to the central office, but anything under \$100,000 can be approved at the regional level. At one point, every change order went to the governor for approval. Once a change order hits 10% of the total contract value, the governor must approve it. They are using all ink signatures.

The average change order approval process was anywhere from 1-2 weeks to 1-2 months. They can now do verbal approval of change orders, which allows inspectors to document work for the change order that needs to be performed while the paperwork for the change order is being executed for payment.

The agency began using SiteManager in 1998 and began expanding statewide in 2003. Alabama has been a traditional AASHTOWare state for many years. It uses BidExpress as well as an internal system called CPMS (Comprehensive Project Management System). Projects start there and die there. The agency developed a branch of this system for requests to sublets for subcontractors, civil rights, & DBE records, but there are no payrolls.

Alabama built its own CAMMS (Construction And Materials Management System), which manages all DWRs, diaries, quantities, estimates, change orders, etc. After development and implementation of the Materials portion is complete, they will be retiring SiteManager and using CAMMS exclusively. They decided to do this because SiteManager customizations were time consuming and did not always give them the result they needed.

They are still doing the rest of the paperwork such as contracts, plans, forms, placement reports, field books, etc. the way they always did: document management and retention systems are currently 100% paper.

Alabama's top e-Construction priorities are:

- 1) To make the field entry efficient:
 - a) Streamline accessibility.
 - b) Get tablets into field staff hands.
 - c) Get documents, standards, plan sets, etc. To an accessible portal.
- 2) To have all DOT systems communicate and collaborate.
- 3) To make documents accessible
- 4) To piece everything together to move forward.
 - a) They have identified many of the keys, just need to figure out how to make them all work together.

They have one project as a pilot for 3D models where the contractor will use automated machine guidance, and they have two pilot projects for using tablets for inspectors. They also have a pilot for UAV usage. They do not have a road map or implementation plan.

3.3 Missouri

Organizationally, MoDOT went from 10 districts down to 7. There are between \$500 and \$600 million in construction contracts administered annually.

MoDOT was one of the first in the nation to fully implement SiteManager in 1999. They are looking further into ESRI, sample tracking, barcodes, inventory systems, and apps.

MoDOT has shifted a lot of the quality management to the contractor. It required them to train the contractors to focus more on a quality management process. The critical factor in the process was getting the contractors to share information with the DOT.

They converted forms from all types of file formats into fillable pdf files.

eProjects is the Missouri internal SharePoint site. It eliminates the use of multiple drives that were not universally accessible. Once a project is created in design phase, it saves it and can be tracked throughout the project lifecycle. System rolled out in July 2016. They still use ProjectWise for design. All this occurs behind the Missouri firewall.

E2O (Excel to Oracle) and CRE2O (Contractor Reported Excel to Oracle) entries from field diaries can be dumped into Oracle. Programs have been developed in-house to meet their needs.

Reporting features were very important to provide information to executive levels. They have always used a third party reporting application that can work with SiteManager. They currently use Cognos (version 10). They currently have 1,264 reports through Cognos. When they transition to Project, they may have to rewrite many of the reports depending on the structure of tables, etc.

3.4 Iowa

Who is using DocExpress in Iowa?

- DOT Staff
- Contractors
- Consultants
- Suppliers/Producers
- FHWA
- State Auditors

Iowa is paperless through their process, from planning to design to contract letting to construction.

The construction budget is approximately \$1 billion. The state just had a gas tax pass, and so the budget will increase by about \$200 million. However, the agency is also losing approximately 15% of its staff. It will be reducing in-house CEI from more than 95% to about 80-90% in-house.

They are moving to many cloud-based solutions as their internal staff decreases.

Their current e-Construction system is comprised of:

- BidX. <https://www.bidx.com/ia/main>
 - Iowa has not printed plans since 2012. All bidding is administered through BidX.
 - Revisions to bid documents are handled through the designer pre-letting and posted to BidX. Post-letting, the designer is making revisions and forwarding that info to the RE office, who manages distribution to the awarded contractor.
- PDF files of plans/proposals/specs (Available on website only)
- Electronic Reference Library (ERL). <http://www.iowadot.gov/erl/index.html>
- Field Manager/Field Book for contractor pay

- Fillable PDFs for mobile forms (PDF Expert)
- In-house developed LIMS system
- Doc Express. https://docexpress.com/login?return_to=%2F
 - Iowa is doing contract signing 100% paperless through DocExpress. They are finding that a lot of these projects are being notified, awarded, and executed in less time than it takes local projects to even send out notification of award.
- Electronic Records Management System (ERMS). <http://www.mydotdocs.iowadot.gov/>
- Materials Approved Product List Enterprise (MAPLE). <https://maple.iowadot.gov/>
- GIS Rest Services to share data such as project locations, letting and bit item information, maintenance plow locations, etc. Info can be shared with the public (<http://iowadot.maps.arcgis.com/home/index.html>).
- Web-Based Technical Training and Certification Program (still administer testing in-person, electronic testing was new in 2015). <http://www.iowadot.gov/training/index.html>

The Iowa Lettings page is at: <http://www.iowadot.gov/contracts/lettings.html>

In terms of future directions, Iowa is looking at PlanGrid to see if this makes sense for them. PlanGrid would allow project staff to collaborate on marked-up or revised documents simultaneously.

Benefits Iowa is realizing from e-Construction:

- Transparency
- Industry partnerships
- No 'lost' tickets
- More time on the job instead of the office
- Faster processing
- Lower costs
- More accountability.

4. AASHTOWare Discussion and Demonstration – SiteManager / FieldManager and AASHTOWare Project Construction and Materials Conversion

4.1 Missouri’s AASHTOWare Experience

Lori Greer provided a demo on AASHTOWare. They expect to be up and running with the web-based application in April 2018. In addition, they noted that MoDOT:

- Is currently testing through a demo site only. Missouri SiteManager data has not been pulled into the demo site yet.
- Is currently identifying issues in the set-up and user interface.
- Has eight people performing testing right now. (Three are from IS, five are from Central Office). Additional district construction staff will begin testing in January 2017 when they have access to some of their own data in the demo.
- Will migrate data on a contract by contract basis.

Missouri is also testing DocuSign at this time.

5. Document Management and Collaborative Project Sites – ProjectWise, DocExpress, and SharePoint Demonstrations

5.1 Iowa's DocExpress Experience

Janet Wastenev then provided a demo and discussion on Iowa's DocExpress has grown far faster than they had imagined. They currently have more than 800 users.

Iowa has 651 total active contracts in DocExpress and over 400 contracts that are locked (closed out).

- Iowa went into it with the intent of making it extremely user-friendly. They developed a user guide to be used internally and for the contractors.
- DocExpress has an intuitive searching and filtering tool. The system acts like a filing cabinet, with drawers and folders for items.
- In Iowa, a contract is set up in DocExpress approximately 6 weeks prior to letting by a system administrator.
- A system administrator can set up access to anyone who requires it, whether a DOT, contractor, or consultant user. The new user receives an email with a registration link (which expires in 2 weeks). Once they complete registration, an email is sent back to Iowa and they grant access to specific contracts.
- System administrators can send bulk emails to users for special instructions.
 - For example, Iowa DOT IT changed the email addresses for all Iowa users, which was an unannounced and unexpected change. Iowa emailed Info Tech (who produces DocExpress) to notify them of this change. Info Tech emailed instructions back to Iowa, who could then email all users with instructions from Info Tech. In addition, Info Tech also made the necessary adjustments so if users did not make the adjustments themselves, it was already taken care of.
- Users have the option to turn notifications on/off based on their preferences.
 - Notifications are emails that are delivered to advise each user when a document which requires their action has been delivered to a drawer.
 - Notifications can be delivered in real time, or in a daily report that is emailed every morning with a summary of all the changes/notifications from the past day.
 - Each notification includes a link directly to the appropriate contract/drawer.
- Iowa does have file naming conventions -- there are not a lot of restrictions, but they ask that it's always consistent and simple.

Signatures in DocExpress:

1. No Signature needed
2. Approval checkbox
3. Approval checkbox + 'signed' name, where user must type (certify) the document based on their username

Contract modifications:

- Created in FieldManager
- Saved to pdf
- Submitted through DocExpress
- Signed in DocExpress (through all workflows)
- Marked as Final in DocExpress
- Stored in DocExpress

Payrolls:

Submitted by prime contractor.

Contract Signing Drawer:

Only two people in Iowa have contract signing authority. If you should need authority to sign contracts, the user must enter a contract ID set-up wizard. They must enter driver license info. Info Tech will verify identification and provide a digital ID. It is advisable to back up the digital ID, which stays with the computer, so users should have a backup copy in case of a computer crash or upgrade.

Once a contract is awarded, the winning contractor is provided access into DocExpress where they have access to a set of documents, instructions, and workflows. One workflow they must address is bond verification. DocExpress only accepts Surety 2000 (a third party supplier of unique bond digital IDs.) The contractor will then enter the unique bond ID, which then goes back to the Iowa Office of Contracts, who can then mark complete once all other required workflow items are processed. DocExpress validates the bond ID through access into Surety 2000.

Training:

Janet Wastenev wrote a user guide and developed some training videos for Iowa users.

<https://www.youtube.com/playlist?list=PLurY2WfsVWKmhWvrbQx-veZvn1SQbZL0q>

Electronic Records Management System (ERMS):

Once a contract is locked in DocExpress, they notify ERMS, who then pulls that contract's docs and stores in ERMS. Right now, they are manually pulling records from DocExpress into ERMS. They are working on an FMS system to automatically pull the documents into ERMS from DocExpress once it is marked as a Locked status.

Field users can access DocExpress through logging into the DocExpress website. They do not have an app - it's all web-based.

Cost:

Iowa buys a site license -- originally the cost per contract = for \$4M contract or above, it was \$2,000 per contract and under \$4M contract it was \$900 per contract. Now they pay approximately \$150,000 per year for the enterprise license.

Phasing in DocExpress:

Iowa started by asking a few of their districts to participate, as well as a handful of contractors they knew would be supportive. It spread like wildfire and most of their users are now dependent on the system.

5.2 SharePoint

James Pflum of Missouri DOT provided a demo of the Missouri SharePoint site.

- Missouri still runs with a Windows Explorer based file system, based on Network Drives with a standardized set of file folders automatically created.
- They have implemented eProjects to now house all project documentation from design through close-out.
- Missouri has not maximized the workflow process within SharePoint yet.

- They can access all the normal SharePoint functionality for project files; they are moving away from the Windows Explorer file folder models. Instead they are using the document properties associated through SharePoint for tagging, sorting, and filtering of files and projects.
- They also have a SharePoint site available to external users (contractors, consultants).
- In addition, contractors can access a plan room:
http://www.modot.org/business/contractor_resources/OpenLetting.shtml

Missouri device policy allows for:

1. DOT-provided devices OR
2. Stipend for use of your personal phone for DOT purposes
 - a. Airwatch app is used for protection of DOT info.
 - b. If you no longer are a DOT employee, Airwatch will remove DOT files/apps/systems from your personal phone
 - i. Iowa advised that Airwatch is not compatible.

6. Alabama's Construction and Materials Management System

Internal ADOT tool can open from anywhere that has web connectivity. It is built on a C-Sharp platform (NVC) and has the following features:

- Project accessibility
- Project originates from preconstruction system from AASHTOWare Preconstruction
- In house written interface to populate CAMMS
- DWRs
- Daily Diary summary
- High level project summary
- Mobile device accessibility
- Data entry from the field
- Data stored behind the firewall through an Oracle database
- Internal access to the system is based on the user's login to the ALDOT network.
- External access, whether ALDOT employees, consultants, or vendors, is through the internet with a secure login and password into the system.
- Interface that connects all the dots between SiteManager and CAMMS
- Custom reporting
- Pay items
- Still using field books for quantities
- Materials still being managed through SiteManager

SiteManager will eventually go away. The agency is trying to do the bare minimum online now until they can cut the cord on SiteManager. The GIS section is anxious to interface with CAMMS.

About 16 to 18 people are just working on CAMMS at present, including the Project Manager (Mike Johnson), programmers, etc. They did not really evaluate outsourcing the development, preferring to undertake the effort in-house. The development team has embraced Agile & Scrum methodologies.

They had to go to the top to get buy-in from senior leadership.

7. Discussion on Digital Signatures

The following summarizes the key takeaways of a roundtable discussion on how each agency is treating digital signatures.

Iowa

- All signatures are managed through DocExpress. The state has a digital signature policy which DocExpress meets. They have no need for signatures of anything outside of documents being handled through DocExpress.
- Currently in the Design section, Iowa bundles their plan sheets into a single file and signs the bundle. Plan sets are created and edited in MicroStation. They are using a third party vendor to provide signatures to be used in MicroStation.
- Iowa state code identifies where a signature is required. If Iowa can move forward without requiring signatures, they will do so.

Tennessee

- State standard is Adobe Sign, but the agency has other needs outside of State policy boundaries.
- Tennessee has identified that it is not just documents being signed during construction, but it is also the policy surrounding the digital stamping and signing of plan sheets.

Missouri

- The DOT will initiate DocuSign on December 1st.
- The agency has a workflow element that shows which documents are waiting for signatures.
- Chief Contracts Office is the source of DocuSign specification.

8. e-Construction Mobile Devices: iPads and Windows Tablets in Missouri and Iowa and the TDOT Pilot Project

8.1 Missouri

The biggest issue Missouri has identified with tablets is the difference between iPads and Microsoft (MS) devices. Compatibility was an issue. At this time, Missouri has not committed one way or another on iOS vs MS devices.

They did get some Dell Latitude tablets. Missouri found these tablets were not user-friendly.

Missouri IS has a policy that each user could have only two devices, including computing and phone. Users did not feel that they could replace a laptop completely with a tablet.

In 2013, they found that the Apple store had many more apps than the non-Apple stores.

Missouri does have a Bring Your Own Device (BYOD) policy, allowing staff to use their own tablets for work purposes which requires using the Airwatch app, which adds security and allows for access into Missouri systems.

There are a lot of inspectors pushing technology up from the field.

PDF Expert (and demo)

- Can markup revisions to PDFs on an iPad through PDF Expert.
- Digital signatures will show up.
- Form fields work.
- You can load standard forms to the device and field staff can enter through PDF, then save files.
- You can add photos.
- Adobe Reader app is not as user friendly
 - You cannot make markups in the Reader app.
 - Digital signatures do not always work in the Reader app.
- Iowa uses PDF Expert for signatures for quantities in the field, especially items like paint and seeding.
- One challenge they currently have is saving files to a central location through network connectivity.

AuditBricks

- Great for punch list items and finalization.

Polycom

- Can do video conferencing (like FaceTime) from the field.
- Can link in multiple parties.
- Device neutral.
- Free app.
- Requires VPN network.

Faster Scan

- Takes a photo.
- Can convert/save as image file or a PDF.

Measure Your Land

- Can measure areas based on Google maps.
- Does not have instant map data -- all data is based on last update from Google maps, so it may not always be showing accurate real-time conditions.

Google Earth Pro

- Can measure areas and distances.
- Export MicroStation data and load into Google Earth pro.
- Iowa uses Google Earth to import .kmz files to lay over Google earth maps
 - For Right of Way (ROW)
 - Traffic control plans
- If you have GPS enabled device, you can access location services to pinpoint your location.
- You can look at street view and get a sense of design info – it's not perfect.

Remote Desktop

- VPN access from the field.
- A Microsoft app that provides access to your desktop.

Photos

- Can upload to eProjects.
- No official Missouri policy.

Bluebeam Revu

- Missouri is piloting on desktops.
- Can do markups.
- As-builts.

Scout Network

- Missouri traffic camera system.
- Can log in from anywhere and view traffic cameras.

Basic GPS

- Can provide latitude/longitude data.

SharePlus

- Access SharePoint.

Mobile Log Finder

- Inspectors can determine their log miles in the field.
- Provides location data based on GPS from phone.
- Phone sends coordinate info back to TMS.
- TMS provides a table back to inspector with log mile data in table form.
- Missouri built this in-house based on an inspector's idea - Missouri IS developed in house.
- They are making available to contractors.

8.2 Iowa

All of Iowa is using Apple devices. Iowa asked them to pilot only a few devices in the field to keep it simpler for piloting purposes. iPads seemed to take off as opposed to other devices; people found they were more rugged for field use. Iowa staff currently each has a laptop, an iPad, and a flip-phone. They have to support laptops in the field. FieldManager is not compatible with devices.

PDF Expert

- Pile logs - can make edits in the field and drop into the PDF.

ProjectWise

- Surveying uses ProjectWise for storage of .kmz files.
- Inspectors can access this data remotely through iPads.

Collector

- Inspectors and maintenance staff use this app to collect data for inventory.
- It will log sample locations.
- It is an ESRI-based app (<http://www.esri.com/>).
- Inspectors can log material testing data (only four questions are required to marry it to the inspection report).
- It's also logged into asset management.
- Maintenance staff is doing culvert inventories.
- They are moving data to an Oracle-based database.
- Main goal is to eliminate as-builts (long term goal).

Survey 123

- To be used for all field samples.
- Also connected to ESRI.

Google Docs

- Having this app allows users to upload documents to DocExpress.
- Users do not have to be logged in to Google for it to work.

Q: Cross-referencing different systems - how can you be sure the data is being stored in one place and all users are using the same data?

A: Iowa has found they are collaborating more through these e-Construction systems.

Q: How do you ensure continuity across the state for users/devices?

A: Iowa first pre-loads apps onto iPads. Shared iPads are used for temporary inspectors. Inspectors use Airwatch, which will also pull in all of that user's info, including email, onto the iPad.

8.3 Tennessee

Tennessee made the decision to be a Windows shop. The agency wanted to replace all devices with a single tablet. Tennessee selected the Dell Latitude 7275, which is approximately \$1200-\$1500. (For more information, see: http://www.dell.com/us/business/p/latitude-7275-laptop/pd?ref=215_title&oc=cto2l727512amerw10p&model_id=latitude-7275-laptop)

They have leadership buy-in.

Tennessee is using it as a laptop replacement, not an iPad replacement. The battery length is similar to a laptop, which is significantly less than that of an iPad. For the initial roll-out, the agency:

- Ordered a handful for IT to test for a few months
- Ordered 200 for distribution, allotted as follows:
 - 50 distributed to Maintenance division.
 - 40-50 for construction support.
 - 36 for each of the field offices.
- Scattered equally across the state.
- They want to order 600 more tablets.

Tennessee is also testing Verizon connectivity statewide through these devices.

To stand up the effort Tennessee purchased Litmus, an online training program to help with field training for devices. During the pilot testing, they will invite the 36 field office users to come back to Nashville to discuss usability and do some in-person training for various apps and general use.

Tennessee has always been good at standard pay quantity forms. In the late 1990s the agency came together to standardize their pay item forms. At that time they also bought laptops for all their inspectors. When they went to SiteManager, they did not want to give up the standardized forms they had developed. They were finding that data transfer of DWR calculations into SiteManager was problematic: they were getting the final results, but losing the calculation data.

They created their own Tennessee DWR form (DWR Demo)

- The form was built in Electron and interfaces with C Sharp.
- The only time you need to be connected is when you hit the Sync button.
- The system requires an API to sync it to AASHTOWare.
- Tennessee wants to keep SiteManager as the backbone and build tools around it as needed to give staff what they need.
- It is still in test form.
- You can copy data from a previously entered DWR
 - Requires inspectors to enter weather data
 - Right now the weather info is manually entered.
 - They may identify apps that can automatically populate weather data from location services.
 - Includes data fields that automatically drop down where users can enter calculations/data based on the selection for individual items.
- Tennessee has a development team of 4 people working in 13-day sprints (10 working days).
- The form has a stylus tool that will translate handwritten info from the stylus on a tablet into text.
- The agency is looking at building a custom force account tool that can interface with SiteManager as well.
- Also looking to integrate with SharePoint (or whatever document management tool they decide on in the future).
- Can upload photos and save to SharePoint.

Maintenance Quality Assurance Program

- Done in parallel with the DWR forms.
- Same platform and basic template as the DWR.
- Used for maintenance QA inspections.

Average Unit Prices

- Can be used to find historical pricing data.
- Accesses data from AASHTOWare contracts for five low bids for contracts.
- Users can query for various sorts of data:
 - Low prices per quantity by area
 - Contractor pricing history
 - Other data.
- Accessible to Tennessee users via their intranet right now.

8.4 Grants and Funding

FHWA advised the most frequently asked question regarding e-Construction in EDC-3 is 'how can states or local agencies acquire electronic devices for their agencies?'

Note: Contractor-furnished equipment/supplies that are returned to the contractor at the end of the project are eligible at the contract bid prices.

~~~~~

~

Q (CA): E-construction. Caltrans has a pilot program to use tablet computers in construction. The tablets are used for plans, specifications, policy manuals, etc. instead of paper. We have had issues regarding procurement of tablets. We have heard other states area able to purchase tablets. Is this done by the state or by the Contractor?

A: There are different way to approach this. Please work closely with your local FHWA Division Office and the following are a few different approaches to consider:

1 – **The state may use their own funding.**

2 – **If the equipment is being purchased for the purpose of a **Research and Technology**, one may look at the eligibility of Federal-aid for R&T activities:**

<http://www.fhwa.dot.gov/research/>

### Research Funding- Transportation Research Funding

Funding for Federal Highway Administration's (FHWA's) Research and Technology (R&T) Program is provided under [Title 23 of the U.S. Code, Chapter 5: Research, Technology, and Education](#), as amended by Division A, Title I, and Division E of the [Moving Ahead for Progress in the 21st Century Act \(MAP-21\)](#). Division E of MAP-21 provides the authorization for Federal Highway Administration (FHWA) to use funds from the Highway Trust Fund to conduct research and technology (R&T) activities, which include the [Highway Research and Development Program \(HRD\)](#), authorized at \$115 million for fiscal years 2013 and 2014, and the [Technology and Innovation Deployment Program](#), authorized at \$62.5 million for fiscal years 2013 and 2014.

Additionally, States are required to set aside funds for the [State Planning and Research \(SP&R\) Program](#). Out of four Federal-aid formula program allocations from Division A, Title I of MAP-21, the States must set aside two percent for planning and research purposes. At least 25 percent of these funds (approximately \$180 million per year) must be used for research, development, and technology purposes. States use these funds to conduct research aimed at solving specific transportation issues at the State level, or States may leverage these funds by applying them toward Transportation Pooled Fund projects. States can also use these funds as the non-Federal match for Local/Tribal Technical Assistance Program Centers and for the University Transportation Centers. In addition, States have agreed to contribute 4 percent of State Planning and Research funds for Future Strategic Highway Research Program (SHRP2) implementation.

**The MAP-21** also authorizes FHWA to lead the [implementation of results and products from the Future Strategic Highway Research Program \(SHRP2\)](#). Funding for SHRP2 implementation will be drawn from

two sources: the Technology and Innovation Deployment Program, and the State Planning and Research Program.

**3 – If one were looking at the computer as being part of a larger management system, one may consider the use of Surface Transportation Block Program. More information about this category of funding may be found at:**

<https://www.fhwa.dot.gov/fastact/factsheets/stbgfs.cfm>

Adjustments to Federal share- Sliding scale

23 U.S.C. 120(a) and (b) authorize an upward adjustment (the “sliding scale”) to the Federal share for a State containing Federal and nontaxable Indian lands. A sliding scale State is eligible for an increased Federal share based upon the location of the project—90-95% for an applicable Interstate project and 80-95% for any other project. The amount of the upward adjustment is based on the percentage of Federal and nontaxable Indian lands in the State. (See FHWA [guidance](#) for the specific share allowable in each sliding scale State under this provision).

*Innovative project delivery methods.* A project incorporating innovations described in 23 U.S.C. 120(c)(3) is eligible for an increased Federal share of up to 100% if funded by the National Highway Performance Program (NHPP), Surface Transportation Block Grant (STBG) Program, or Metropolitan Planning program. **The FAST Act added specific mention of innovative engineering or design approaches and project delivery methods as activities eligible for this increased Federal share.** [FAST Act §1408(a)] (citation: <https://www.fhwa.dot.gov/fastact/factsheets/federalsharefs.cfm>)

**4 – One may also consider applying for STIC and Federal-aid grant funding. More information about these programs is available at:**

<https://www.fhwa.dot.gov/innovation/>

**STIC Incentive Program »**

Offers technical assistance and funds – up to \$100,000 per STIC per year – to support the costs of standardizing innovative practices in a state transportation agency or other public sector STIC stakeholder.

AID Grants – The FHWA expects approximately \$10 million to be made available for AID Demonstration in each FY 2016 through 2020 from amounts authorized under section 6002 of the FAST Act. The planned award type is a grant that is allocated to a State department of transportation (State DOT) through project authorization, or for Federal Land Management Agencies and tribes through existing agreements with FHWA Federal Lands Highways Division. The FHWA has funding award goals of up to \$9 million available to State DOTs per FY and up to \$1 million available to Federal Land Management Agencies and tribal governments per Start Printed Page 60404FY. These funding goals will be reviewed annually and may be adjusted to reflect current priorities and needs.

The amount of each award may be up to the full cost of the innovation, but only to a maximum of \$1 million. Awards are limited per FY of up to two per State DOT applicant, with up to one award for a State DOT and up to one award for a subrecipient applying through the State DOT, and limited to one award per applicant for Federal Land Management Agencies and tribal governments, subject to the number of eligible applications and the availability of funds.

5 – The state may acquire the equipment/supplies with their own funding and include these costs in their indirect cost allocation plan, charging Federal-aid construction projects the appropriate allocable share.

6 – As a last resort, the acquisition of equipment and supplies may be done through contractor furnished equipment on a Federal-aid construction project. State acquisition procedures are preferred as State procedures are usually more cost effective than procurement through a construction contractor. However, if it is necessary to acquire the supplies or equipment through a Federal-aid construction project and the Division Office agrees that the associated costs are necessary, reasonable and allocable, then the provisions of 2 CFR 200.33, 200.94 , 200.313 and 200.314 apply. More information can be found at:

<http://www.fhwa.dot.gov/federal-aidessentials/catmod.cfm?id=11>

---



## 9. FHWA Division Office Pilot Program

Ten States are participating in the FHWA Division Office Pilot Program:

|                     |                                                                              |
|---------------------|------------------------------------------------------------------------------|
| <b>iPads</b>        | Florida, Iowa, Michigan                                                      |
| <b>Surface Pros</b> | Missouri, North Carolina, Pennsylvania, Texas, Utah, Virginia, West Virginia |

- Kat Weisner was instructed to use a Surface Pro independently as her only device. She uses an external monitor.
- FHWA is piloting these devices to see if their staff can interface properly with their individual states' systems via the devices to access:
  - FHWA reports
  - State DOT systems.
- FHWA does not have authority to purchase apps from a non-Apple app store.
- FHWA went through a push to provide laptops to all of their staff
  - The laptops were extremely cumbersome, expensive, heavy, awkward to use in the field.
  - Docking stations were able to log the hours the laptops were docked.
  - They found that people were not using the laptops in the field because they were too awkward to carry.
- Participants have VPN access.
- FHWA staff, as Federal employees, must have their personal identity verification (PIV) card installed to operate their hardware, which presents challenges:
  - iPads cannot accept these devices.
  - They are cumbersome and easy to break.
  - There is only 1 USB port on the Surface Pros.
- FHWA is no longer receiving paper copies.
- FHWA is reviewing business processes to understand what they are legally required to be copied on.
- FHWA has determined they do not require paper copies.
- FHWA must, in some cases, revise their operating procedure to be able to accept electronic copies of required documents.
- In states where they are maintaining paperless records/archives (Pennsylvania for instance), all records for change orders, etc. are being stored electronically.
  - FHWA does not have copies of this electronic data.
  - States are recognizing that they need to change strategy to address their records retention policy.
- The pilot program users are very pleased with their devices. They do not want to give the devices back!

## 10. e-Ticketing Pilot Projects in Iowa

### 10.1 Hot Mix Asphalt Pilot

Iowa performed a pilot project for Hot Mix Asphalt (HMA) in 2015.

The key to success for this type of thing is finding the right software providers who want to partner with you and develop a customized solution. Lee recommends finding those software vendors who are lean and hungry to work with them through the process and be more nimble in responding to their needs. Some of the larger vendors are not as agile at responding to specific custom systems.

Iowa does not have an inspector at the plant, only an inspector at the point of placement.

Iowa interpreted FHWA QA code to include collecting paper tickets for each truck entering the worksite.

Pilot Project: Fleetwatcher, a web-based software tool developed by Earthwave, uses a hardwired GPS unit that plug into the lighter. There are also some portable GPS trackers that can be used in various vehicles. The GPS unit sends a location tracking ping every minute. The contractor will program based on the contractors' shifts. The GPS units have 14 hours of battery backup. The reporting system would also tell you whether the unit was plugged in and functioning properly. If the unit loses cellular service, it will store the location data and transmit it as soon as connectivity is available.

- Purchase price for the GPS units is \$400/each or rental fee of \$200/month. Units are provided through Fleetwatcher. Total cost for pilot was approximately \$20,000.
  - Iowa checked with FHWA local representatives to make sure it was okay to pilot.
- Every morning, the contractor has to ensure they are tracking which GPS unit went into which truck.
- Fleetwatcher uses geozones around project-specific areas at plant, scales area at plant, and project limitations.
  - Contractor will draw directly onto Google maps to show the jobsite as well as the plant locations.
- Dashboard provides for truck tracking for each project - where trucks are, how many are in service, etc.
  - Provides real time data for tracking of trucks
  - Tonnages come from the load out system from the scales -- going directly into the software
  - Provides for graphical data analysis.
- Material Summary Report provides a quick summary data for each ticket, including waste data.
- Material Summary Report for pay sums up all the batch weights and tonnages for the day per mix.
- Iowa inspectors can access a real-time map in the FleetWatcher app to see where trucks are located, data for loads, and total data for the day. Inspectors can also add in comments.
  - Bread crumbing provides for verification of haul routes.
- They did use paper tickets as a back-up on the pilot project.

Iowa is still in negotiations with weight enforcement officers to determine the required data. Iowa wrote a developmental specification. Once they receive final approval, they will start adding it into select bidding documents. Using this system, Iowa can move from having two inspectors (one taking tickets and one taking temperatures), to just 1 inspector taking temperatures.

The agency would like to integrate this into their specifications within the next 3-4 years. Their specification will provide for the information required in a generic format, so as long as the contractor can meet those specifications, they can use whatever software they choose.

## 10.2 Iowa Concrete Pilot

Iowa looked at multiple software providers for concrete. Trimble was extremely expensive just to pilot. ConcreteGo used a system called iSTRADA, which is just out of beta testing phase.

Iowa has piloted on one project so far; already the contractor from that one pilot project has asked Iowa to require its use on all projects in that District.

Iowa purchased 12 iPads for use in the trucks on the pilot. There is a QR code assigned to each truck. The iPad goes with the driver, so each time the driver changes trucks, he scans the QR code to begin tracking.

If the driver forgets to hit the 'transport to jobsite' button, the program will automatically start tracking when the truck gets 400 yards outside the point.

Once the truck arrives at the jobsite, the driver hands the iPad over to the inspector, who can use the app to enter the ticket and materials info. There is a tab on the program for Inspection data to be entered. The inspector can reject the load directly through the app. An email is generated when the material is marked as "rejected."

The app will also track truck locations and provide notifications that are available immediately to provide better timing of communications. It also provides summaries of key times recorded, status reports, and dashboard reporting per job.

Iowa is still piloting projects using this technology. One big challenge they have identified is ensuring the drivers update the app -- in just a few months there have been three updates to the app.

Iowa is talking to the Iowa asphalt and concrete associations to communicate their intent and plans among the vendors and contractor.

## Appendix A – e-Construction Peer Exchange Agenda



### Tennessee DOT, Alabama DOT, Missouri DOT, and Iowa DOT e-Construction Peer Exchange



TDOT Headquarters – James K. Polk Building  
7<sup>th</sup> Floor Conference Room  
505 Deaderick Street  
Nashville, TN 37243



### Agenda

| Day 1 – November 15, 2016 |                                                                                                                                  |                                                                                           |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| Time                      | Topic                                                                                                                            | Presenters / Facilitators                                                                 |
| 8:00am – 8:45am           | Welcoming Remarks and Introductions<br>Peer Exchange Background and Overview                                                     | Kat Weisner – FHWA<br>Will Reid – Tennessee DOT<br>Skip Powe – Alabama DOT                |
| 8:45am – 9:00am           | Background on Tennessee DOT's e-Construction Activities and Plans                                                                | Jay Norris – TDOT                                                                         |
| 9:00am – 9:15am           | Background on Alabama DOT's e-Construction Activities and Plans                                                                  | Skip Powe – Alabama DOT                                                                   |
| 9:15am – 9:45am           | Missouri e-Construction Overview                                                                                                 | Lori Greer and James Pflum – Missouri DOT                                                 |
| 9:45am – 10:15am          | Iowa e-Construction Overview                                                                                                     | Lee Shepard and Janet Wasterney – Iowa DOT                                                |
| 10:15am – 10:30am         | Break                                                                                                                            |                                                                                           |
| 10:30am – 11:45am         | AASHTOWare Discussion and Demonstration – SiteManager/Field Manager and AASHTOWare Project Construction and Materials conversion | Lori Greer – Missouri DOT<br>Janet Wasterney – Iowa DOT                                   |
| 11:45am – 1:00pm          | Lunch (provided)                                                                                                                 |                                                                                           |
| 1:00pm – 3:00pm           | Document Management and Collaborative Project Sites – ProjectWise, Doc Express and SharePoint Demonstrations                     | James Pflum – Missouri DOT<br>Janet Wasterney – Iowa DOT                                  |
| 3:00pm – 3:15pm           | Break                                                                                                                            |                                                                                           |
| 3:15pm – 4:00pm           | Discussion on Digital Signatures (Electronic Contracts and Change Orders)                                                        | TDOT/ALDOT/MODOT/IADOT                                                                    |
| 4:00pm – 4:30pm           | Discussion on Day 1 Takeaways for Implementation<br>Preview of Day 2 Agenda Items                                                | Tom Zagorski – Michael Baker International<br>Michele Horak – Michael Baker International |
| 4:30pm                    | Adjourn                                                                                                                          |                                                                                           |
| Dinner on your own        |                                                                                                                                  |                                                                                           |

| Day 2 – November 16, 2016 |                                                                                                                     |                                                                                          |
|---------------------------|---------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| Time                      | Topic                                                                                                               | Presenters / Facilitators                                                                |
| 8:00am – 8:15am           | Recap of Day 1 Discussion Themes                                                                                    | Tom Zagorski – Michael Baker International                                               |
| 8:15am – 10:45am          | e-Construction Mobile Devices (data collection): iPads and Windows Tablets in Missouri and Iowa TDOT Pilot Project  | James Pflum – Missouri DOT<br>Lee Shepard – Iowa DOT<br>Jay Norris – TDOT                |
| 10:45am – 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                                           | FHWA/All                                                                                 |
| 11:30am – 12:45pm         | Lunch (provided)                                                                                                    |                                                                                          |
| 12:45pm – 2:30pm          | e-Ticketing Pilot Projects in Iowa<br>Discussion on Ideas for Implementation of e-Ticketing for Material Deliveries | Lee Shepard – Iowa DOT<br>James Pflum – Missouri DOT                                     |
| 2:30pm – 2:45pm           | Discussion on Takeaways for Implementation                                                                          | Tom Zagorski, Michael Baker International<br>Michele Horak – Michael Baker International |
| 2:45pm – 3:00pm           | Closing Remarks, Feedback on Peer Exchange, and Next Steps                                                          | All                                                                                      |
| 3:00pm                    | Adjourn                                                                                                             |                                                                                          |

## Appendix B – e-Construction Peer Exchange Attendees

| Name             | Organization                | e-Mail                   |
|------------------|-----------------------------|--------------------------|
| Tom Zagorski     | Michael Baker International | tzagorski@mbakerintl.com |
| Lori Greer       | Missouri DOT                | Lori.greer@modot.mo.gov  |
| James Pflum      | Missouri DOT                | James.pflum@modot.mo.gov |
| Greg Spradley    | Tennessee DOT               | Greg.spradley@tn.gov     |
| Brandon Crowley  | Tennessee DOT               | Brandon.crowley@tn.gov   |
| Chance Dittfurth | Tennessee DOT               | Chance.dittfurth@tn.gov  |
| Gayle Hollis     | Tennessee DOT               | Gail.hollis@tn.gov       |
| Vonda Lane       | Tennessee DOT               | Vonda.lane@tn.gov        |
| Gerald Varney    | Tennessee DOT               | Gerald.varney@dot.gov    |
| Janet Wastaney   | Iowa DOT                    | Maureen.bluhm@dot.gov    |
| Lee Shepard      | Iowa DOT                    | Lee.shepard@iowadot.us   |
| Jay Norris       | Tennessee DOT               | Jay.norris@tn.gov        |
| Will Reed        | Tennessee DOT               | Will.reid@tn.gov         |
| Chris Hampton    | Tennessee DOT               | c.w.hampton@tn.gov       |
| Hunter Golson    | Alabama DOT                 | golsonwi@dot.state.al.us |
| Jeff Shelley     | FHWA Alabama                | Jeff.shelley@dot.gov     |
| Susan Powe       | Alabama DOT                 | powesm@dot.state.al.us   |
| Kat Weisner      | FHWA                        | Kathryn.weisner@dot.gov  |
| Mike Johnson     | Alabama DOT                 | johnsonm@dot.state.al.us |
| Skip Powe        | Alabama DOT                 | powes@dot.state.al.us    |
| Michele Horak    | Michael Baker International | mhorak@mbakerintl.com    |
| Joe Kirk         | Tennessee DOT               | Joe.kirk@tn.gov          |