

e-Construction Lead State Profiles

This document is intended to provide a brief high-level snapshot of e-Construction practices for 13 Lead States. This document is designed to assist exploring States and others interested in implementing e-Construction tools.

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Arkansas State Highway and Transportation Department

Paperless Status

- AHTD has both internal systems and commercially available software in use, with integration between internal systems and AASHTOWare products. Additional e-Construction tools are being added to the AHTD program.

Software Used

- **BidExpress** – Electronic bidding tool.
- **DocExpress** – Collaboration tool for project document management including electronic workflows and electronic signatures. AHTD has authorized purchase of an annual site license for use of DocExpress.
- **AASHTOWare Project** – A suite of web-based and client-server applications with various modules for managing the project throughout its life cycle.
- **SiteManager Access Reports System (SARS)** – An internally developed tool for querying SiteManager data and producing reports for contract management.
- **Change Order Generation System (COGS)** – An internally developed tool for managing change order documentation and approvals.
- **Headlight** - Piloted software for mobile inspection.

Field Data Collection Technologies

- Currently testing Dell Windows tablets as the primary mobile device.

Digital Signatures

- DocExpress is the primary tool used for workflows and electronic signatures on documents. BidExpress is used by the Contractors to digitally sign bids.

Construction Program

- Interstate Rehabilitation Program – nearly \$1.2 billion in projects under construction or scheduled.
- Connecting Arkansas Program – over \$1.8 billion in projects under construction or scheduled.

Workflow Process

- A construction project is bid electronically using BidExpress. Once a project is awarded, DocExpress is used to allow collaboration between the Department and the contractor in the development and signing of the construction project contract. Once a contract is signed, management of DocExpress for that contract is transferred to the Construction Division for construction document management. This final step is currently being set up for a pilot project in mid-2016.

Highlights

- Using an e-Construction specification on projects.
- Held a peer exchange with West Virginia in October 2015 to highlight technologies.

Florida DOT

Paperless Status

- Over 20,000 pieces of paper replaced, on 4 projects, by the use of a mobile device.
- Full implementation of project collaboration site occurred in September 2015.

Software Used

- **SiteManager** – field project management for inspectors to input data.
- **Citrix** – iPad interface to access SiteManager.
- **ProjectSolve** – SharePoint based project collaboration platform (outside FDOT firewall).
- **Electronic Document Management System (EDMS)** – A database for final archiving of project files for records retention purposes.
- **Hummingbird** – Document storage (inside firewall with access via VPN).
- **MAC** – LIMs developed in-house (source code can be shared with other agencies).
- **IdenTrust** – Digital signatures.
- **Blue Beam** – As-builts and field changes.

Field Data Collection Technologies

- iPads for field data collection.
- Input through Citrix interface to SiteManager.
- Secure access for specific project stakeholders through Blue Beam.

Digital Signatures

- IdenTrust. Research performed. Process implemented gradually. Task force formed to research & hire firm to authenticate certificate holders' identity. Issued MOU between FDOT & consultant/contractor associations. Developing training.
- Florida Statute 668.50 deals with the electronic signing of commerce docs. FDOT levied the language from that statute that they added to their specs. When a district puts a contract out for let – the district can add this requirement to their bid/contract docs. In the future, this spec will be required. System-wide during summer of 2016. Design has used digital signatures for years & for plan sets and sealing drawings.

Construction Program

- 535 active construction contracts with total value of \$11.5 billion in 2014.

Workflow Process

- Communication into ProjectSolve goes to consultant, who sets up workflow process, and then district administrators set up the individual site access. Project collections allow updates to projects that then update all users with access to that collection.

References

<http://www.dot.state.fl.us/statematerialsoffice/mac/>

Highlights

- Using an e-Construction specification on projects
- Held a peer exchange with MassDOT in September 2015 to highlight technologies

Iowa DOT

Paperless Status

- Projects are 99 percent paperless, with the use of Document Management system and electronic plans used for construction inspection. The last step is integrating weight tickets and scale information electronically based on the results of the pilot test.

Software Used

- **Doc Express** – post letting document management system – Workflow, material certifications, contract documents, plan room, shop drawing reviews, payroll submittals, and contract modifications including electronic signatures.
- **Electronic Reference Library (ERL)** – Online specs, Construction manual, road standards, Materials IMs, Bridge standards, etc.
- **Adobe Connect** – Web meeting service.
- **FieldBook and FieldManager** – field project management for inspectors to input pay quantity data.
- **PDF expert** – Plan reading/markup, fillable forms, and storm water review documentation.
- **LIMS** – In-house developed Materials Library.
- **Collector ArcGIS** – Field Collector app for GIS data collection (previously used Fulcrum) to be fully implemented in 2016 for all HMA projects.
- **GPS Outline** – To gather latitude/longitude at a requested location.

Field Data Collection Technologies

- **iPads** – iPads were the only device that had the cellular connection and GPS features that we wanted to use for data collection and access. Microsoft Surfaces are also being tested, but still lack some of the features that are important to our data collection at this time.

Digital Signatures

- **DocExpress** –Utilizing the electronic signature process that is built into Doc Express.

Construction Program

- \$700 million in 2014, 650 contracts.

Workflow Process

- Workflows have been developed in Doc Express for Material certifications, contract modification; Plan Room and shop drawing workflows now being developed.

References

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

[http://www.iowadot.gov/Construction Materials/materials_forms.html](http://www.iowadot.gov/Construction%20Materials/materials_forms.html)

<https://forms.iowadot.gov/BrowseForms.aspx>

Highlights

- 100 percent use of DocExpress for Document Management.
- E-Construction is has been adopted with great support from industry and agency partners.

Michigan DOT

Paperless Status

- They rate themselves as 99 percent paperless – only thing they are using paper on are the tickets for materials.

Software Used

- **FieldManager** – collect data in the field, upload to FieldManager, which stores docs in ProjectWise. Does not technically interact with ProjectWise. Inspector's daily work report – instead of printing piece of paper, they print to PDF and drag to its permanent spot in ProjectWise.
- **Mobile Inspector** – New app (an InfoTech product) – which they think will replace FieldBook. Mobile Inspector will be compatible.
- **ProjectWise** – document storage.

Field Data Collection Technologies

- **iPads** – Was only mobile device at the time that was rugged enough and had out of the box connectivity, etc. Had some issues with Windows devices. Just finished a study making recommendations for usage & hardware.

Digital Signatures

- Education and outreach were key to successful implementation. Once contractors started using e-Sign they realized potential for savings. Compliance with State and Federal regulations.

Construction Program

- \$1.2 billion dollar program in 2015.

Workflow Process

- System facilitates workflow. Change orders, submittals, RFIs have workflows, but not all documents do.

References

https://www.youtube.com/watch?v=y_9XCy2IQ2w&feature=youtu.be

<https://www.youtube.com/watch?v=HAbYgggnyB8&feature=youtu.be>

<https://www.youtube.com/watch?v=ScB1b3fqjQo>

Highlights

- Long-established and recorded use of e-Construction in the field.
- Thorough exploration and comparison of mobile devices/laptops.
- Close to being paperless.
- All trunkline projects in 2015 will use e-Construction documentation process.

Minnesota DOT

Paperless Status

- Has implemented some office and field components and working toward integrating all e-Construction practices to allow for a paperless program to support overall State of MN Sustainability Plan.
- Letting, Award, and Approvals for Central Office and Inspection on Projects.
- Plans and Special Provisions Transmitted Electronically.

Software Used

- **AASHTOWare**; full production with Preconstruction application and CRL application and piloting and beta testing the AASHTOWare Project Construction and Materials 3.0 application. The estimation application will follow implementation.
- **Citrix** for web-based access.
- **Adobe Reader** (electronic contract documents for inspectors).
- **Transit Automated Control System (TRACS)** – used extensively for design-build projects due to collaborative features, while personnel on all projects have access. TRACS is a content management system that is used for collaboration (written in Visual FoxPro).
- TRACS is linked with LIMS for materials certification/management but will be replaced by another COTS document management system.
- **Primavera Desktop and Enterprise** – contractors are required to build and maintain project schedules (for those projects with CPM requirement) on MnDOT servers.

Field Data Collection Technologies

- iPhones, iPads, and laptops with air cards.
- Pilot project is underway to determine feasibility of Windows Tablets.
- Working to use rovers for electronic data to develop as-builts and for asset management.

Digital Signatures

- Contracts signed electronically.
- Use Topaz Tablets for e-Signatures – working toward digitally encrypted signatures and electronic approval of supplemental agreements.

Construction Program

- 2013 Program \$1.2 billion, 276 Projects.

Workflow Process

- Route contract change documents and supplemental agreements for electronic signature.
- Partial estimate for payment – email notifications for contract payment group.

References

- <http://www.dot.state.mn.us/const/tools/references.html>
- <http://www.dot.state.mn.us/const/tools/forms.html>

Highlights

- Looking to implement a new collaboration software package that will integrate all the components currently in place.

Missouri DOT

Paperless Status

- All projects are 90 percent paperless prior to June 2015; 99 percent paperless after June 2015 - paper tickets and two affidavit forms still not electronic.

Software Used

- **SiteManager** – for contract administration: materials management, pay quantities/estimates, diaries, and change orders.
- **MS Excel** - Contractor Reporting Excel2Oracle (CRE2O) forms allow contractors to upload information directly into SM.
- **ProjectWise** - Contract plan and Job Special Provision (JSP) storage.
- **Bid Express** - Only electronic bids are accepted; post letting information.
- **Adobe Pro/Reader** - Used for document management and digital signatures; electronically signed and sealed construction plan sheets.
- **SharePoint** - Document storage.
- **Blue Beam Revu** - Coming the Fall of 2015 for document management, digital signatures, and PDF mark up final plans.

Field Data Collection Technologies

- iPads, Tablets, and laptops with WiFi, MiFi, hotspots, etc.

Digital Signatures

- Most contract documents were digitally signed as an option; as of June 2015 all contract documents require digital signatures except for two notarized forms that must be on paper per state law.

Construction Program

- FY 2015 - \$720M, FY2016 - \$596M programmed.
- 330 Construction/Material Inspectors and Technicians.

Workflow Process

- Workflow is managed through ProjectWise, SiteManager, and SharePoint.

References

<http://www.modot.org/business/index.htm>

<http://epg.modot.org>

http://www.modot.org/business/standards_and_specs/highwayspecs.htm

http://www.modot.org/business/standards_and_specs/standardplans.htm

Highlights

- MoDOT has been using electronic bidding since September 2006.
- E-reader versions of MoDOT's specifications and standard plans are available.

Oregon DOT

Paperless Status

- Oregon is in a test pilot phase of paperless construction using an Electronic Document Management System (EDMS) and electronic forms for inspection and payment documentation.
- Next steps are to begin 15 pilot projects in Late-2016 to Early-2017 integrating the use of tablets for inspection and contractor access to project documentation with the EDMS.

Software Used

- **AASHTOWare** – Pavement ME Design
- **AASHTOWare** – Project BAMS/DSS
- **AASHTOWare** – PES®/LAS
- **AASHTOWare** – Project Expedite
- **AASHTOWare** – Project Estimator
- **AASHTOWare** – Preconstruction
- **AASHTOWare** – Bridge Design
- **AASHTOWare** – Bridge Management
- **AASHTOWare** – Bridge Rating
- **ProjectWise** – Design and Construction. This is a document management system – Workflow, material certifications, contract documents, plan room, shop drawing reviews, payroll submittals, forms, access to and storage of large files, and contract modifications including electronic signatures.
- **Direct Access** – Internet connection to ODOT network by remote access
- **Adobe Acrobat Pro** – PDF access for fillable documents and annotating.
- **Microsoft Office** – Word, Excel, Outlook, PowerPoint, etc.
- **CoSign Digital Signature**
- **Windows 10** – environment

Field Data Collection Technologies

- **Surface Pro** – Microsoft Surface Pro 4's are being tested for wide-spread use throughout the Construction Section by those in the office as well as those who work in the field. iPads were tried in a 2015 summer project, but did not efficiently function with our Windows-based computer systems.
- **Data Plan Hotspots** – The option is available to add a hotspot Wi-Fi to the smartphone to facilitate internet connection in the field away from established connections.

Digital Signatures

- **CoSign** – ODOT is utilizing the digital signature process from CoSign that provides a minimum of Level 2 verification to meet the Oregon specification. Contractors and local agencies may use CoSign or any digital signature company that provides a minimum of Level 2 verification. ODOT is also narrowing the types of documents that require digital signature. The current thought is documents that modify Contract terms will require a digital signature. Non-digitally signed documents will require identification of the document author

Construction Program

- ODOT's Construction Program typically has about 120 to 150 active projects. In 2015, ODOT processed about \$390 million in Contractor payments.

Workflow Process

- In the discovery phase, exploring options for workflow in ProjectWise using Rules Engine or Deliverables Management.
- Workflow to handle management of communication internally and with contractors.

References

<http://transnet.odot.state.or.us/hwy/Eng-Automation/SitePages/Home.aspx>

<http://www.oregon.gov/ODOT/HWY/CONSTRUCTION/pages/hwyconstforms1.aspx>

Highlights

- E-Construction has been adopted with great support internally and with Agency partners
- Test Pilot began in April 2016 to test naming conventions, folder structure, and further vetting of document processes.
- ODOT's robust firewall and security issues have been addressed by working in the Project Wise environment.

Pennsylvania DOT

Paperless Status

- Submittal reviews 100% paperless once into Construction phase. Design-builds are 100% paperless from the design throughout construction.

Deployment Status

- 100% of projects use PPCC (SharePoint) throughout the construction process (including design-build) to manage submittals and provide additional collaboration resources.

Software Used

PennDOT Project Collaboration Center (PPCC or P2C2)

- SharePoint-based document management system utilizes a single, top-level website (portal) to manage work at a state-wide or district-wide level. Users can manage all of their projects from a single website.
- In conjunction with the portal-level site, PPCC utilizes individual project-level websites to manage project specific documentation and to allow workflows for each project site to be modified as needed. All project-level websites report “up to” the portal-level site.
- Includes dynamic multi-step/multi-reviewer workflows, submittal tracking, and document storage.
- Provides at-a-glance work queues for actionable work items.
- Offers project-specific calendars, photo/video libraries, announcements, and links.

Engineering and Construction Management System (ECMS) – Proprietary website used as primary project management tool for design, construction and business partner interaction with PennDOT. Recently expanded to include Construction Documentation System (CDSv3) to replace the CDS NeXtGen Documentation system. CDSv3 allows for direct input of Project Site Activities (PSA) (or Daily Field Inspection Diaries) or for uploads from the PSA app from iPads. CDSv3 generates estimated payments from the PSAs and generates project work orders. CDSv3 provides an audit and report facility.

- Asphalt and diesel fuel adjustments are automated through ECMS based on the date placed or work performed.

Electronic Construction and Materials Management System (eCAMMS) – eCAMMS replaced the Construction and Materials Management System (CAMMS) and the New Product Evaluation and Tracking System (NPETS). eCAMMS also includes interfaces with other applications to enhance efficiency. eCAMMS is a web-based application used to submit and report on material sampling. eCAMMS allows public searching of statewide approved sources for materials for individual projects.

Electronic Document Management System (EDMS) – An electronic documentation management system for records retention. Shop drawings are linked to the Bridge Management System as well.

SAP – Internal time and payroll system.

Microsoft Office

Field Data Collection Technologies

Mobile Construction (MC)

- All construction employees throughout the State were issued iPads for field data collection.
- MC applications are available to PennDOT Business Partners at no cost through Apple's Business to Business (B2B) program (PennDOT legal team helped with process to accept Apple's agreement for this program).

Applications developed for the iPad include:

- A custom-developed application that downloads all applicable plans, specifications, and standards for each project.
- Daily Force Account Records (extra work records for time and equipment) captured within an application that allows for field signatures and uploads to ECMS for further workflow and document retention.
- Concrete Inspection Book combined with the Cylinder Break form that uploads and downloads data from multiple systems.
- Inspection applications for Americans with Disability Act (ADA) Ramps and Maintenance and Protection of Traffic Inspection were created to simplify the forms and allow for easier field use and less paper and rework
- All projects have an ongoing Punch List where inspectors can upload and download the status of items.

Digital Signatures

- Process has been developed and training will occur in November 2015.
- Using Adobe software for digital signatures.
- Working on process with PA Engineering Board for digital PE seals/stamps.

Construction Program

- Average 75 construction status projects per year.
- Averages \$670 million per year.
- All current construction projects are utilizing PPCC, SharePoint.
- Fifty-six current construction projects are using CDSv3 mobile computing, 100% will be doing so moving forward.

Workflow Process

- Electronic submittal workflows are established on a project-specific basis and are created in PPCC at the beginning of a project.
- These workflows notify the appropriate reviewers and monitor the submittal throughout the process, reporting on each user action along the way.
- Workflow is dynamic and can be changed as required to add/remove steps, add/remove reviewers, or add/remove entire workflows.
- PPCC is currently only used for construction (including Design-Builds). PennDOT does not currently use the system internally during design or between departments.
- CDSv3 has built in review and approval process for PSAs.

Highlights

- The new software systems are web-based and easily accessible.
- All Internet browsers can access ECMS and PPCC. iPads have Virtual Private Network (VPN) access and Virtual Desktop to allow access to network drives and files.
- Reports and audits can be completed without having to be on the project site.
- Piloting SharePoint on design processes to integrate with construction.
- Piloting ProjectWise for design submittals.
- For maintenance, an asset mgmt. program is being developed – hope to tie specific mix designs into that system for long term evaluation of performance of specific mix designs.
- Also interested in drones for various activities.
- Originally contractor initiated submittal and PennDOT initiated workflows – flowcharts are developed for standard workflows – administrator in each district creates site and provisions site for workflows.
- Working toward system checks to see that payment can be made.
- Automated force account process – electronically develop daily records with workflows.

Texas DOT

Paperless Status

- Currently using e-Construction for design applications, contract administration, archiving, and planning for data collection, materials, and core custody.

Software Used

- ExeVision for electronic bidding.
- HeadLight – piloted this application for mobile inspection documentation.
- **SiteManager** – data collection in the field. TXDOT has highly customized to their needs.
- **I2MS & SiteManager Interface Computer (SMIC)** – LIMS systems and custom system that links to mainframe for project execution.
- **ProjectWise** – document storage and minor workflow items.
- **Primavera Scheduling** – used in design; updated construction contracts.
- **EquipmentWatch** – Supports equipment rental rates for change orders.
- **StockPile Reports** – App for measuring stockpiles and generating volume estimates.
- **Adobe and Skitch** – markups and as-built annotations.

Field Data Collection Technologies

- **iPads** – providing to all field staff.
- **CITRIX or VPN access to SiteManager.**
- Dropbox for transferring files.
- Considering additional types of tablet devices including Surface Pro.

Digital Signatures

- **Adobe Pro or DocuSign** - piloting it now, no formal policy. Not everyone has license. Also use workflow systems through SharePoint to route workflows and generate approvals.

Construction Program

- \$13.3 billion in contracts.
- Current workforce of 700+ inspectors.

Workflow Process

- SiteManager and ProjectWise and DocuSign.

References

<https://www.youtube.com/user/TxDOTidp>

Highlights

- Customized and field-tested SiteManager to their needs.
- Quantifiable efficiency and cost-savings.

Utah DOT

Paperless Status

- They rate themselves as 25 percent paperless – they have been paperless for many years on certain items, but still have a long way to go.

Software Used

- **Interchange** – SharePoint platform for project collaboration.
- **MasterWorks** – Aurigo system for field data entry – will act as interface for field activities – enter FIDs, LIMs info, etc. thru any operating system.
- **ProjectWise** – document storage.

Field Data Collection Technologies

- All types of devices and operating systems are compatible with MasterWorks. Inspectors are using smartphones, tablets, and laptops.
- Field laptops and digital cameras for electronic plan sets and documentation.

Digital Signatures

- iPD Portal has functionality for electronic approvals.
- Plan underway to address electronic signatures for 3D models.

Construction Program

- 30 full time inspectors, and 500 cross-trained transportation technician inspectors.

Workflow Process

- All workflows managed through Interchange (SharePoint).

Highlights

- Advanced process for RFP and selection of field data software supplier.
- Have highly-evolved culture of improvement and adoption of e-Construction technologies and processes.

Virginia DOT

Paperless Status

- Created a central repository to reduce generation of secondary paper documents.
- Intent to reduce or eliminate printed documentation for 90% of active construction and 90% of construction procurements.

Software Used

- **AASHTOWare** – suite of software provided by AASHTOWare that handles or augments project estimating as well as bid letting and award
- **AdLib** – PDF generator/manager
- **Bentley ProjectWise** – cloud accessible repository for drawings; allows for collaborative workflow and reviews
- **Blue Beam Revu** – PDF handler
- **Citrix** – field interface to access SiteManager
- **Civil Rights Labor Management System** – reduces or eliminates paper documentation relative to Civil Rights related submissions; AASHTOWare component
- **IdenTrust** – Digital signatures
- **MITS/PLAID** – In-house software created by and for the Materials group to manage internal tasks and supplier provided data.
- **Project Document Management System (PDMS)** – A repository for procurement and active construction project documentation; internally developed using SharePoint and K2
- **SiteManager** – field project management for inspectors to input data

Field Data Collection Technologies

- Laptops for field data collection
- Access to cellular wireless cards as needed
- Secure access provided by RSA security tokens and VPN
- Smartphones

Digital Signatures

- IdenTrust where signatures are required.
- Code of Virginia Section 59.1-485 recognizes electronic records, signatures and contracts as legal.

Construction Program

- 436 projects advertised with total value of \$1.2 billion in 2015
- 275 active construction contracts with total value of \$2.7 billion in 2015
- 475 projects completed with total value of \$1.7 billion in 2015

Workflow Process

- Construction Procurement: plan submission; collaborative specification review; advertisement preparation and release; bidding period addendums and estimating; letting and contract award
- Construction Management: document submission and review; transmittal and review
- Contractor Administration: registration and security management

References

- <http://law.lis.virginia.gov/vacode/59.1-485/>
- <https://pdms.cov.virginia.gov> (to be released Spring 2016)

Highlights

- Specification relative to e-construction being developed for use on VDOT projects
- State-wide, collaborative input on home-made document management system (PDMS)
- Integration of ProjectWise to further digitally process RFIs, plans and shop drawings
- Large-scale automation and reduction of construction procurement via workflows and paperless documentation

Washington State DOT

Paperless Status

- WSDOT is experimenting with some construction offices leading the way by keeping documents in their electronic format instead of printing everything. Offices are using SharePoint, ProjectWise, Enterprise Content Management (ECM), and WSDOT standard servers as data storage facilities within the WSDOT IT firewall.
- WSDOT is in the process of reviewing e-Construction software. WSDOT is also reviewing internal business models and data flow, with the goal of a RFP for new e-Construction software.

Software Used

- **InfoPath & SharePoint** – Construction field inspectors create daily diaries of construction activities, which are reviewed by office staff in SharePoint. Inspectors also create field notes for contractor payment of work done, which are also reviewed and approved by office staff in SharePoint.
- **ECM** – Limited agency wide usage through a web portal to store, search documents, search workflows, retention management, search reports, search data, workspaces, and search audit logs.
- **ProjectWise** – Limited usage by Design and Construction. This is a document management system.
- **Cisco/VPN** – Internet connection to WSDOT network by remote access.
- **Adobe Acrobat Pro** – PDF access
- **Bluebeam Revu** – Powerful PDF creation, markup, editing and collaboration tool is being tested by some construction offices.
- **Microsoft Office** – Word, Excel, Outlook, PowerPoint, etc.
- **CoSign Digital Signature**
- **Windows 10** – mobile environment

Field Data Collection Technologies

- **Mobile Devices** – WSDOT staff utilize standard PC's, laptops, 2 way tablets, ruggedized tablets, and Survey/GIS data collectors, all used in the appropriate setting.
- **Data Plan Hotspots** – The option is available to use a Mi-Fi hotspot device to facilitate internet connection in the field away from established connections.

Digital Signatures

- **CoSign** – WSDOT is utilizing the digital signature process from CoSign that provides a minimum of Level 2 verification to meet the Washington specification.

Construction Program

- In 2015 the WSDOT's Construction Program had 131 advertised projects for \$563 million in awarded contracts.

Workflow Process

- In the discovery phase, exploring options for workflow and data flow improvements.
- Reviewing workflow to handle management of communication internally and with contractors.

Highlights

- E-Construction has been adopted with more improvements on the way.
- WSDOT, Minnesota DOT, and Texas DOT conducted a research project from August 2013 to present and scheduled to end in 2017 with Pavia Systems – Project Inspection Using Mobile Technology. Phase 1 involved an investigation into existing business processes and areas for improvement using mobile technology, published August 2013. Phase 2 involved assessing the impacts of mobile technology on project inspectors, published January 2015. Pavia Systems provided Apple iPads with rugged covers for the field running an application created by Pavia Systems called Headlight used on test construction projects by field inspectors. A web version of Headlight was developed to allow personnel in the office to access the field observations and daily reports generated by the Headlight Mobile Client. The reports, WA-RD 840.1 & 840.2, are available at <http://www.wsdot.wa.gov/Research/Reports/>

West Virginia DOT

Paperless Status

- Started process officially at request of WVDOT management six years ago on a statewide level.
- They are following the FHWA EDC system.
- Approximately 80 percent paperless.

Software Used

- **SiteManager Construction, Materials, LIMS** – field project management for inspectors to input data.
- **Citrix** – Interface to SiteManager for DOT management, FHWA and Contractors
- **ProjectWise** – linking attachments from SiteManager to store documents. ProjectWise now stores all construction project files.
- **Primavera** – Used on project that have CPM requirement.
- **AASHTOWare** – Project Preconstruction, expedite, DSS, Project Bids, exploring CRL
- **Bidx/Bid Express** – All projects are bid electronically. No paper bids allowed.
- **ERP/wvOASIS** – Enterprise Resource Planning which includes a host of software programs for one time entry process. These programs are a result of a 120 million dollar investment for efficiency across all State Government agencies. www.wvOASIS.gov

Field Data Collection Technologies

- iPads used by management for SiteManager approvals.
- Input through Citrix interface to SiteManager.
- Granting access for FHWA Contractors to SiteManager and ProjectWise through providing state credentials.
- Every inspector on every construction project throughout the state has an assigned Laptop with VPN access to connect to our servers using SiteManager/ProjectWise (600+ users).

Digital Signatures

Doc Express – WV to work with InfoTech to explore implementation.

Construction Program

- \$500-600M per year.
- Currently have 866 active construction projects at a value of \$1.4 billion.
- WVDOT has 6th largest road network in the country in terms of road miles owed, operated, and maintained.
- WVDOT is ranked 1st in the country in terms of percent of roads within a State maintained by a DOT (93 percent).

Workflow Process

- Automated through SiteManager & ProjectWise with use of online manuals.

References

<http://www.transportation.wv.gov/highways/contractadmin/Pages/default.aspx>

Highlights

- Every contract let since May 2012 has been managed through SiteManager.
- Every contract let since January 2014 has had document records maintained via ProjectWise.
- Allowing for FHWA and contractor interface.
- Held a peer exchange with Arkansas in October 2015 to highlight technologies and exchange information on practices.