Participant Workbook

FHWA Division Office EDC-3 e-Construction Webinar

Dates: September 25, 2014 2:00 pm – 3:30 pm (EST), and
September 30, 2014 10:00 am – 11:30 am (EST)

Location: http://fhwa.adobeconnect.com/assetmgmtmtg/

Teleconference: 877-336-1839

Access Code: 8085178

AASHTO
Innovation Initiative

U.S. Department of Transportation
Federal Highway Administration

Contents

Background on e-Construction

The administration of highway projects requires a significant amount of documentation, and a new joint FHWA and AASHTO initiative is designed to assist States with implementation of a paperless construction administration and delivery process known as e-Construction. The e-Construction process includes electronic submission of all construction documentation by all stakeholders, electronic document routing/approvals (e-signatures), and digital management of all construction documentation in a secure environment allowing distribution to all project stakeholders through mobile devices.

Several State Departments of Transportation (DOT) and industry practitioners are already using or testing some aspects of e-Construction. Some are even in the process of mainstreaming many of the aforementioned e-Construction system practices. The proposed e-Construction system is supported by many tools and practices that currently exist to improve communication and make construction management practices more efficient. e-Construction has the potential to increase the quality, efficiency, environmental sustainability, and productivity of the construction industry at large while at the same time saving on printing costs, time, postage, and document storage as well as adding communication efficiencies. To date, e-Construction has been proven by several agencies. Through enhanced awareness and promotion of benefits and examples of its application, the highway industry is ready to reap the benefits of program-level implementation.

Organization of this Workbook

In order to assist States with implementation of e-Construction, FHWA's Every Day Counts 3 (EDC-3) Program, in conjunction with AASHTO's Innovation Initiative, is hosting two webinars for all FHWA Division Offices to learn more about existing practices, successes from other agencies, and how to help your respective State transportation agency. FHWA Division Office representatives need only attend one webinar, as both events will include the same information but allow for flexibility in attending. This workbook will be available for download after the webinars on the EDC-3 website, and a recording of the event will also be made available.

This workbook is designed to accompany the webinar by providing a copy of presentation slides with an area where participants can take notes on the topics

presented. The first presentation will be from FHWA highlighting the background on the joint initiative, followed by presentations from Florida DOT and Michigan DOT on their e-Construction practices, challenges, and successes. The final portion of the webinar will include open discussion on suggestions for the types of activities that FHWA and AASHTO should undertake to help agencies further implement e-Construction nationally.

Following the webinar, FHWA and AASHTO will facilitate seven EDC-3/All Regional Summits across the United States. Each Summit will include presentations by State subject matter experts, along with discussion in an effort to draw out the most appropriate activities to help spur implementation by less experienced States.

For more information, contact

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Implementation Technical Working Group Members

We would like to acknowledge the input and participation from the following Technical Working Group members:

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Rob Wight Utah DOT	Greg Mulder Iowa DOT	Richard Beckes Minnesota DOT
Stuart Laakso Michigan DOT	Mark VanPortFleet Michigan DOT	Greta Smith AASHTO

Glossary of Terms

As-Built Drawings – Record drawings of completed construction projects or project elements.

Audit Control – A process for assuring achievement of an organization's objectives in operational effectiveness and efficiency, and compliance with laws, regulations and policies.

Authentication – To establish the authorship or origin of conclusively or unquestionably; the use of digital certificates to establish validity and uniqueness.

Automated Forms – Electronic versions of forms that automatically populate or prompt users to enter data, and merges information into a completed version of the form.

Browser – A software program that allows the user to find and read encoded documents in a form suitable for display, especially such a program for use on the internet.

Business Process – A collection of linked tasks which find their end in the delivery of a service or product to a client; a set of activities and tasks that, once completed, will accomplish an organizational goal.

Concurrent Document Reviews – The collaborative review and co-authoring of documents in real time.

Construction Administration Delivery Process – The established process by which the oversight of construction activities is monitored, recorded, and tracked, including filing procedures, the tracking/logging of submittals, and the hierarchy of review.

Data Hosting – The activity or business of providing storage space and access for websites or file sharing applications.

Decryption – The process of converting encrypted data back into its original form, so it can be understood or read.

Design-Bid-Build – A project delivery method through which a project is designed first by an entity, then bid and constructed by a second entity.

Design-Build – A project delivery method through which a single contract is awarded to one entity to deliver both design and construction of a project.

Digital Signature – An electronic signature that can be encrypted, certified, and used on electronic forms and documents.

Electronic Approvals – Approval and signing process enabling individuals and organizations to quickly authorize and sign and approve documents and transactions in an electronic, or on-line forum.

Electronic Document Routing – A business process, where a generated document will be passed from one user to the other via email notifications and task assignments. Each user(s) in the path of the defined workflow will be able to perform a variety of tasks such as review a document, edit attached documents, add attachments, fill forms and much more before passing the batch to the next person or persons in the path.

Encryption – The conversion of data into a format that cannot be easily understood by unauthorized people.

Firewall – An application that monitors traffic between an internal network and the internet and regulates the type of network traffic that can pass through it.

HTTP (Hypertext Transfer Protocol) – A system used to retrieve hypertext files from remote hosts. A HTTP server (HTTPD) is a server that employs HTTP to transfer data. Hypertext transport protocol secure (HTTPS) is a protocol for accessing a secure web server.

Mobile Devices – A portable computing device, such as laptop, tablet computer, smartphone, that allows for connectivity to electronic media through networks or file-sharing systems.

Paperless – An environment in which the use of paper is greatly reduced, diminished, or eliminated; Filing systems are maintained through electronic means.

Project Collaboration Software – e-Construction software system developed and implemented to allow for electronic collaboration among project team members.

Proxy – To transfer data processing tasks to another program or device.

Radio Frequency Identification (RFID) Tags – The wireless use of electromagnetic fields to transfer data, for the purposes of automatically identifying and tracking tags attached to objects. The tags contain electronically stored information.

Secure File Sharing – The public or private sharing of computer data or space in a network with various levels of access privilege.

Server – A computer or computer program that manages access to a centralized resource or service in a network.

SSL (Secure Sockets Layer) Encryption – A security technology for establishing an encrypted link between a server and a client.

System Integration – The process of bringing together the component subsystems into one system and ensuring that the subsystems function together as a system.

Transparency – A situation in which business activities are done in an open way with open access to all parties.

Version Control – A system that records changes to a file or set of files over time so that you can recall specific versions later and track authorship and time/date of revisions

Website – A location connected to the Web that maintains one or more pages on the internet.

Workflow – The sequence of processes through which a piece of work passes from initiation to completion

e-Construction

e-CONSTRUCTION

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Efficiency through technology and collaboration

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e-CONSTRUCTION

Objectives

- What is e-Construction?
- Where did e-Construction come from?
- What can we expect to accelerate deployment of e-Construction:
  - AASHTO Innovation Initiative (Aii)
  - FHWA Every Day Counts (EDC-3)
- Tools under development to accelerate deployment.

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e-CONSTRUCTION

e-Construction is the collection, review, approval, and distribution of highway construction contract documents in a paperless environment

- Electronically capturing construction data
- Electronic submission of all construction documentation
- Increased use of mobile devices
- Increased automation of document review & approval
- Essential use of electronic signatures by all parties throughout the process
- Secure document and workflow management accessible to all stakeholders on any device

Where did e-Construction come from?

Federal Government
- "electronic" found 81 times within MAP-21
- Presidential Memorandum – Managing Government Records, Nov 28, 2011
  - Fullest extent possible, agencies eliminate paper and use electronic record keeping
- Government Paperwork Elimination Act (GPEA) 1998
- FHWA memo September 21, 1989
  - Secure
  - Reliability of Records
  - Storage of Records

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Where did e-Construction come from?

- **State Government**
  - Utah DOT using e-signatures and electronic payroll verifications for over 10 years
  - Texas DOT and contractors using mobile computing for project management on the Dallas Ft Worth Connector Project
  - Florida DOT administering an e-Construction pilot projects
  - Michigan DOT completed pilot projects and engaged full program implementation

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What can we expect from FHWA EDC-3 and AASHTO Aii to accelerate deployment of e-Construction?

- **4-months**
  - 7 regional summits
    - Explanation of technology
    - 2 State Subject Matter Experts presenting how and why they adopted e-Construction
    - Collecting suggested activities to accelerate implementation nationally
  - Implementation plan for e-Construction
- **2015 and 1016**
  - Support and deliver implementation plan activities

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e-CONSTRUCTION

Tools under development to accelerate deployment

- "How to guide" adopting e-Construction manual
  – Florida DOT

- Research Study to document:
  – Cost savings, benefits expected, and return on investment when using e-Construction.

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e-CONSTRUCTION

For Additional Information

https://www.fhwa.dot.gov/construction/
http://www.fhwa.dot.gov/accelerating/edc3.cfm
http://aii.transportation.org/Pages/e-Construction.aspx

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Michigan DOT e-Construction Paperless Contract Administration

Michigan DOT
e-Construction Paperless Contract Administration

Efficiency through technology and collaboration

Presenters:

- **R. Jason Clark, P.E.**
  Michigan DOT Construction Contracts Engineer

- **Cliff Farr**
  Michigan DOT Construction, Technology & Training Engineer

- **Robert Fijol**
  FHWA Area Engineer

**Paperless Components
Already in Place at MDOT**

Electronic Plans/Proposals | Construction Administration Software | Electronic Bidding
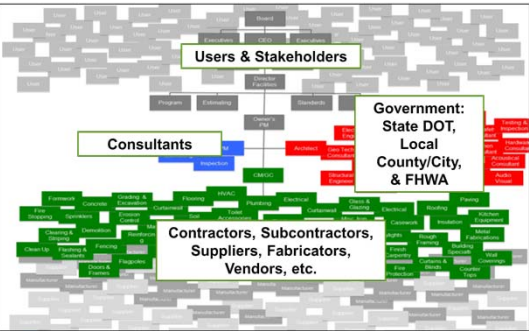
e-CONSTRUCTION

While these improvements clearly helped make us more efficient, why was there still so much paper on our projects?

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e-CONSTRUCTION
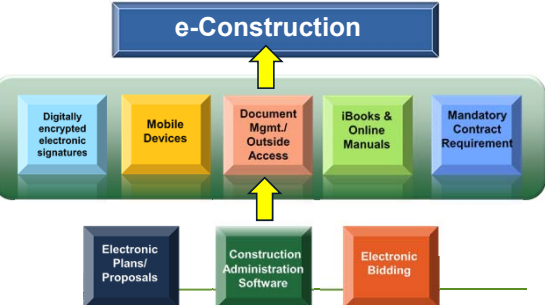
Number of People Involved in a Construction Project

Users & Stakeholders

Government:
State DOT,
Local
County/City,
& FHWA

Consultants

Contractors, Subcontractors,
Suppliers, Fabricators,
Vendors, etc.

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e-CONSTRUCTION

Final Steps to Reach "Paperless" Goal

e-Construction

| Digitally encrypted electronic signatures | Mobile Devices | Document Mgmt./ Outside Access | iBooks & Online Manuals | Mandatory Contract Requirement |

Electronic Plans/ Proposals

Construction Administration Software

Electronic Bidding

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What Does e-Construction Look Like?

Contractors
- Opportunities to cut costs resulting in lower bid prices / more competitive
- Precise knowledge when submittals are approved
- Transparent access to all project information, reducing claims
- Ability to efficiently monitor subcontractor/supplier submittals
- Faster payments (stats showed 5x)

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What Does e-Construction Look Like?

Inspectors
- Ability to use voice data entry
- Elimination of copying/faxing/ scanning of field forms
- Increased efficiency
- Faster problem solving with real-time access to statewide experts & partners (FaceTime)
- Electronic access to manuals, plans & project information
- Markup plans in the field
- **Spending more time on job site**

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What Does e-Construction Look Like?

Engineers
- Increased & timely oversight
- Access to all project documents remotely from mobile devices
- Paperwork starts & stays electronic
- Reduces lost paperwork
- Ability to electronically sign documents remotely
- Increased communication & efficiency
- Quicker management approvals

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What Does e-Construction Look Like?

Management/FHWA
– Transparent oversight
– Access to all project documents remotely for reviewers, auditors, FOIA, etc.
– Ability to electronically sign critical documents on mobile devices between meetings
– Increased communication

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Pilot Projects

- **2012 Pilots Projects Selected**
  - I-96 Latson Road ($25M)
  - M-231 Little Robinson Creek ($5M)
  - M-231 over the Grand River ($68M)
  - I-75 Zilwaukee Bridge ($35M)
- **2013**
  - Pilot projects under construction
- **2014**
  - Each field office had at least one e-Construction paperless project
  - Also utilized on large I-96 project ($160M)

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Implementation Challenges

- **Digital Signatures & Legal Concerns**
  - Compliance with State & Federal regulations
  - Differentiation between electronic & digital signatures
  - Non–sole source or proprietary software
  - Education of small contractors
  - Mobile Device compatibility

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Implementation Challenges (cont.)

- **Increased Use of Mobile Devices**
  - Public perception/acceptance
  - Field staff embracing new technology
  - Management approval of purchase costs
- **Document Management Software**
  - IT concerns into government network firewall
  - Accessibility for outside parties
  - Field offices with slow network speeds

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Other Key Contract Administration Issues for Implementation

- FHWA Michigan Office formal approval of paperless contract administration process
- Compliance with FHWA Contract Administration Core Curriculum Manual & other applicable regulations
- Compliance with CFR 23 & CFR 49 DBE regulations
- Compliance with Federal Davis Bacon Prevailing Wage requirements/payrolls
- Insuring process is accessible for all parties & does not create artificial barriers

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Minimal Investment Costs

- Utilized existing document management software
- Upgraded inspectors to smart phones
- Kicked-off use of tablets by field staff
- Purchased apps for mobile devices at minimal cost
- Pilots showed that some offices needed upgraded IT infrastructure

COSTS
BENEFITS BLVD

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Staffing

e-CONSTRUCTION

Staffing

- **Implementation Staffing Costs (1 ½ Years)**
  - 1 lead project manager dedicated to process
  - Core team of 6 subject matter experts
  - 50 staff piloting & testing on projects
  - FHWA, Contractors, Consultants on pilot projects
- **Long-Term Staffing Costs**
  - 2 positions added
  - Reorganization of existing staff
  - Significant Training Efforts

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Estimated Results

- $12 M in cost savings & reduced overhead annually
  - About 6 million pieces of paper saved annually
- Field staff on jobsite for higher percentage of time
- Immediate productivity gains
- Increased employee & stakeholder engagement
  - Enthusiasm drove the process
  - Users presented ideas to make process even better

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MDOT's Goal:
Statewide Implementation
All trunkline projects will use e-Construction documentation process in 2015 Construction Season (October 3, 2014).

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Where Is MDOT Today?

The following stakeholders are in production, including:

– All MDOT construction & materials offices
– 119 contracting firms
  • 322 contractor users
– 31 construction consultant firms
  • 156 consultant users
– 22 FHWA users
– 31 active contracts
  • $354 million as-let contracts

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Next Steps

• **Delivery Tickets**
  – Volume
  – Fraud
  – Future Technologies (RFID)
• **Local Agency Program**
  – Contracting industry
  – Eagerness / Resistance
  – New reality to do business

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Michigan Division FHWA Implementation

• ProjectWise installation coordination with IT
• Updated FHWA local office Standard Operating Procedures to allow for electronic signature & document storage
• Small learning curve with e-Signature & ProjectWise
• Forced our office to adopt paperless documentation procedures

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Michigan Division FHWA Benefits

- Ability to audit a project without leaving the office
- All supporting documentation for contract changes is accessible
- Faster Compliance Assessment Program (CAP) reviews
- Digital Signatures / Faster Approvals
- Electronic documentation storage/archiving

Summary

- Reduces costs for all stakeholders
- Document distribution is immediate
  - No time or money wasted printing & mailing documents
- Documents approved faster
- Faster, more accurate payments to contractors
- Transparency: Documents available for viewing by all project partners
- Accountable: Submittal/approval dates readily available to all
- Portable: Available from any device, any time, any where
- Documents are secure & backed up
- Responds to reality of less staff
- Paper reduction supports "green" environment

Want to Learn More?

- **"Mobile Devices in the Field" video:** http://www.youtube.com/watch?v=y_9XCy2IQ2w

- **"e-Construction Process at MDOT" video:** http://www.youtube.com/watch?v=HAbYgqgnyB8

- **"MDOT e-Construction Technologies" video:** https://www.youtube.com/watch?v=ScB1b3fgjQo

- **Cliff Farr, FarrC@michigan.gov, (517) 897-3672**

The End

FDOT's Path to e-Construction

Managing Highway Construction Projects in a Paperless Environment

Efficiency through technology and collaboration

FDOT's Path to e-Construction

Amy Tootle, P.E. – FDOT
Rafiq Darji, P.E. – FHWA Florida Division

Efficiency through technology and collaboration

Leaping into the 21st Century – Why Now?

1. Antiquated way of doing business
2. Keep up with our partners
3. Work $marter not harder
4. Transformational leadership
5. Generational change
6. Successful organizations continually improve
7. Design is already electronic

e-CONSTRUCTION

Why Now? - Antiquated Way of Doing Business

- Documents and forms are printed, signed, scanned and emailed or mailed
- Multiple copies are made for multiple recipients
- Turnaround for approvals and contract change execution is sometimes very slow
- Special runners are sometimes employed to hand deliver contractual documents

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Why Now? - Keeping Up With Our Partners

- Consultants/contractors are utilizing advanced technology
  - ✓ Mobile Devices
  - ✓ Electronic As-Builts/Review of Plans (Blue Beam, Adobe, etc)
  - ✓ 3D Models > Automated Machine Guidance (AMG)
- Improved collaboration and data sharing amongst stakeholders

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Why Now? - Generational Change

Boomers
- Question Authority
- Idealistic
- Individuality
- Work Ethic

Generation X
- Comfortable with Technology
- Self Reliant
- Accept Diversity

Generation Y
- Tech Savvy
- Highly Educated
- Team Players
- Embrace Diversity

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Why Now? - Work $marter, Not Harder

- Florida's Work Program is one of the largest in the country
  - ➤ Total Funding & Budget for 2014/2015 – 2018/2019 = $41.8B
    - ✓ 47% for Construction
  - ➤ 535 Active Construction Contracts
    - ✓ $11.5B
- State Highway System = 43,424 Lane miles
  - ➤ 287,977,300 Daily Vehicle Miles Traveled (DVMT)

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Why Now? - Transformational Leadership
"Step Up"

- Bold, Innovative, and Inspirational
  - ➤ Bold: Ideas to make the department better, faster, smarter
  - ➤ Innovative: Ideas to fruition by defining specific objectives to accomplish
  - ➤ Inspirational: Get others excited about ideas

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Why Now? - Transformational Leadership
Step Up

- CPR
  - ➤ **C**onsistent: Decisions are made which are consistent with department policy
  - ➤ **P**redictable: Decisions are predictable, given the circumstances
  - ➤ **R**epeatable: Decisions are repeatable by others in similar situations

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Why Now? –Continuous Improvement

- If it Ain't Broke, Don't Fix It (Not acceptable!)
- Actively listen to industry and staff in the "trenches"
  - Their needs
  - Technology being used
- Acknowledge process likely won't be perfect at first
  - Assess
  - Find solution
  - Continue forward

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Why Now? - Design is Already Electronic

- Projects Let Electronically
  - Since 2005

- 3D Design Models
  - Occasional
  - Looking for pilot projects
  - Implementation undetermined

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e-Construction Implementation

- Vision

- Systems Thinking
  - Overall picture
  - Interconnected relationships
  - There are no final answers
  - Every solution creates new problems
- Educate the Districts

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e-Construction Implementation – The Parts

- Collaborative Sharing Site
  - Phased Implementation - November 2014
- Mobile Devices
  - Construction Pilot Project Begin Late 2014/Early 2015
- Digital Signatures
  - Ongoing Implementation

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e-Construction Implementation – The Parts

- Form Automation
  - Ongoing Implementation
- Electronic As-Builts
  - January 2015

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e-Construction Implementation – The Parts

- **Collaborative Sharing Site**
  - October 2013 – Management approval
  - July 2014 – Procured consultant (Project Solve)
  - August 2014 – First Project Activated (I-4 Ultimate)
  - September 2014 – Team devising standard workflows
  - November 2014 – Phased Implementation

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e-Construction Implementation – The Parts

EDMS ← FDOT

Project Share Site ↔ Stakeholders

FDOT ↕ Project Share Site

Collaboration Process

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e-Construction Implementation – The Parts

- **Mobile Devices**
  - ➤ May 2014 – Begin E&O Windows based pilot
  - ➤ November 2014 – End Windows based pilot
  - ➤ Late 2014/Early 2015 – Construction specific pilot
  - ➤ Spring 2015 – Phased implementation for construction

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e-Construction Implementation – The Parts

- **Construction Specific Pilot Project**
  - ➤Interface with project specific SharePoint site
  - ➤Access to eBooks (specifications, standards, manuals)
  - ➤Video/meeting capability
  - ➤As-Builts
  - ➤Email/calendar access

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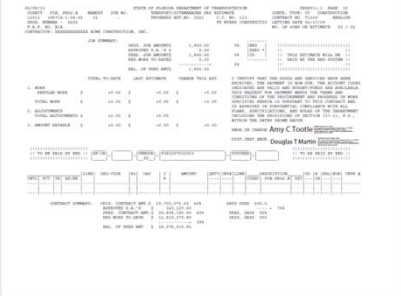
e-Construction Implementation – The Parts

- **Digital Signatures – Ongoing**
  - July 2, 2013 – Initial purchase of 390 digital certificate vouchers
  - July 29, 2013 - Issued Memo of Understanding between FDOT, Florida Institute of Consulting Engineers (FICE) and Florida Transportation Builders Association (FTBA)
  - July 2014 – In process of getting Department of Financial Services to accept digital signatures for monthly estimates
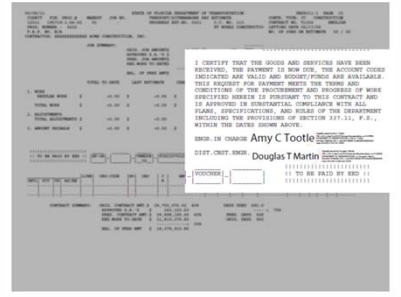
e-CONSTRUCTION

e-Construction Implementation – The Parts

- **Form Automation – Completion November 2015**
  - ➤ Transmittal forms revised to require electronic file #'s
  - ➤ Adding digital signature blocks
  - ➤ Forms to be pre-populated with project specific data
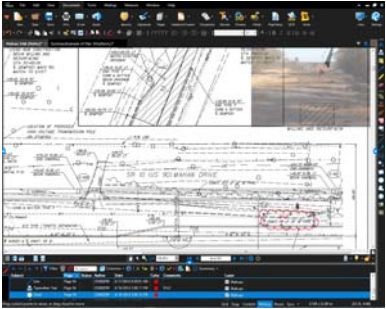
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e-Construction Implementation – The Parts

- **Electronic As-Builts – Implementation January 2015**
  - ➤ July 2013 – Begin phase out of Comp Book
  - ➤ Fall 2013 – Decision to go electronic with As-Builts
  - ➤ Spring 2014 – Decision to use pdf software for As-Builts
  - ➤ July 2014 – Elimination of Comp Book & evaluation of pdf software
  - ➤ January 2015 – Implement electronic As-Builts

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e-CONSTRUCTION

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-PARTNERSHIP-
FDOT & FHWA

Rafiq Darji, P.E.

e-CONSTRUCTION

TOPICS

- Partnership between State and Division

- Establishment of "Innovator Expert Task Team"

- Milestones

- Division Perspective

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e-CONSTRUCTION

- Partnership -

- FDOT management's Bold-Innovative concept

- Many ideas were received and few of them selected

- Division was invited to be part of each task team

- One of the selected ideas was, "Submitting <u>All</u> Construction Documents Online"

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e-CONSTRUCTION

Innovator Expert Task Team

FDOT established - Innovator Expert Task Team for "Submitting all Construction Documents Online"

- Review existing policies, procedures and guidelines

- Make recommendations to FDOT management for switching to e-Construction

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Milestones

- **11/2012   Expert Task Team Launched.**

- **01/2013   Reviewed Project Solve, Project Suite, electronic signatures, long term storage, other states' procedures, etc.-**

- **03/2013   Created draft proposal and presented to FDOT Management- in three phases.**

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e-CONSTRUCTION

Milestones

- **Phase 1: immediate implementation of forms without signatures**

- **Phase 2: implement ability to accept and provide digital signatures**

- **Phase 3: conversion of all standard forms to smart form capability**

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e-CONSTRUCTION

Milestones

- **Identify the special requirements of forms and documents which require signatures**
  - Many documents and forms need to be signed and subsequently need to be digitally signed.

- **Motivate the public to get on board**
  - Doing something like this requires all players to be supportive.

- **Finding out what is LEGAL**
  - Will these electronic documents stand up in court?

Milestones

What are the laws that govern electronic transactions?

State:

Florida Statute Chapter 668 Section 50

Note: The Uniform Electronic Transactions Act (UETA) has been adopted by 47 states within the United States and establishes the validity of electronic signatures in contracts. Yep, Florida was one of them.

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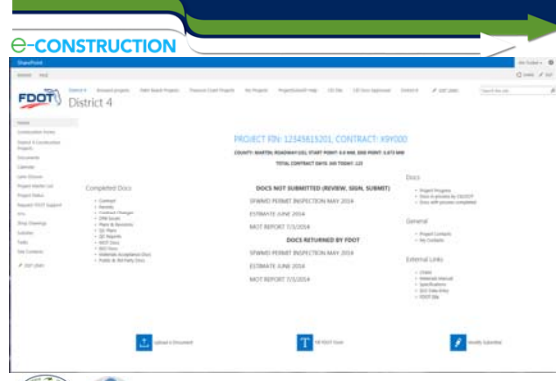## FDOT e-Construction Document Management System

• **FDOT has acquired consultant services for hosting Share Point data base system for managing electronic construction documents**

• **Next generation - ProjectSolveSP is being currently developed**

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FL Division Perspective

- Are there any CFR requirements for e-documentation?

- Project reviews (no hard copies) – Do I really need hard copies for my review?

- CAP, PODI, POCI, and focused oversight reviews – speed up the review process due to electronic access to all required construction documents in advance and might eliminate travel needs

- FL Division has adopted e-filing system for internal document storage and retention.

- Transportation Engineers / Area Engineers will be able to review and sign and submit electronically. Eliminates the need of time consuming scanning for internal storage

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Questions?

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Round Table Discussion

e-CONSTRUCTION

Round Table Discussion

Efficiency through technology and collaboration

e-CONSTRUCTION

Implementation Plan

- We need your input!
- What FHWA- & AASHTO-sponsored activities (peer exchanges, guidance publications, training, etc.) would help accelerate deployment over the next two years?

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e-CONSTRUCTION

Thank you for Joining our Webinar on e-Construction

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