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Objectives

- What is e-Construction?
- What can we expect to accelerate deployment of e-Construction:
 - AASHTO Innovation Initiative (Aii)
 - FHWA Every Day Counts (EDC-3)
- Tools under development
- States Experiences
 - lowa
 - Minnesota
 - Michigan





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









Federal Government Support

- "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





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

- Fall/Winter 2014
 - 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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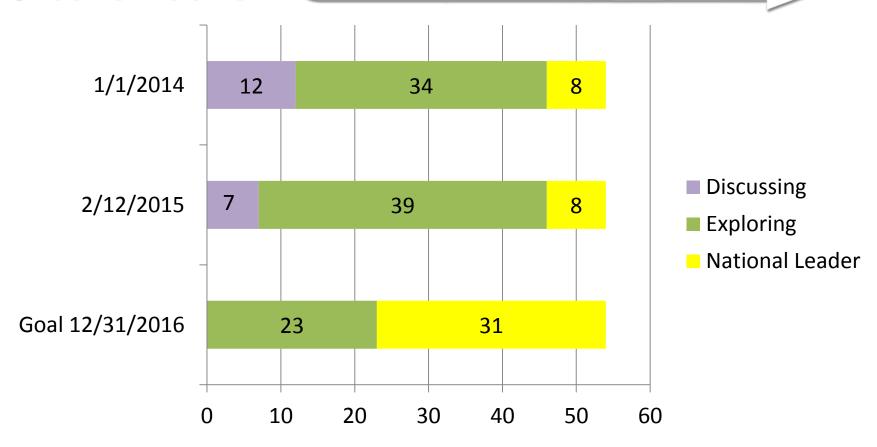
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Definitions:

National Leader - Has constructed 2 or more projects using technology Exploring – Investigation and/or piloting EDC-3 technology Discussing – Not taking part in national EDC-3 technology initiative





C-CONSTRUCTION ΑK WA VT ME MT ND OR MN MA WI NY SD ID MI WY PA CT NE IA ОН NJ NVIL IN DE UT `MD MO KS CA DC NC TN OK ΑZ AR SC NM GA MS AL **National Leader** TX LA **Exploring** FL



Discussing



Definitions:

National Leader - Has constructed 2 or more projects using technology Exploring – Investigation and piloting EDC-3 technology Discussing – Not taking part in national EDC-3 technology initiative

PR





Implementation Plan Activities (AASHTO)

Activity	Responsibility	Due
High-Level transportation industry presentations	AASHTO and all	Ongoing
Resource website (AASHTO users blog site)	AASHTO and FHWA	Ongoing
AASHTO-sponsored or proprietary solutions	AASHTO	Winter 2016
IT security awareness outreach	AASHTO and all	Spring 2016





Document Return on Investment

pilot

FHWA Federal Lands and Division Office

Implementation Plan Activities (FHWA)

FHWA - TFHRC

FHWA

Activity	Responsibility	Due	Delivery
Sharing lessons learned	All	December 2016	3 State DOT Organized Regional Workshops
Peer exchanges (in-person and virtual) with documentation for sharing	FHWA and all	As soon as possible	FHWA Procurement
Application and tool roadmap	FHWA and all	Fall 2015	Captured within Shared Lessons and Peer Exchanges
Technology webinar series	MDOT and FHWA and all	Fall and Winter, 2015 Fall and Winter, 2016	Michigan DOT Lead Series
How-to guide	FDOT, MDOT, and FHWA	Summer 2015	Florida DOT Lead
e-Construction example specifications	FHWA	Fall 2016	FHWA Procurement

Fall 2015

Fall 2015

TFHRC

FHWA Procurement

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e-Construction Return on Investment (Why)

interim findings

State	Why e-Construction
Florida	 About \$40,000 per project/year savings as compared to paper
Iowa	 Reduced costs for all stakeholders Faster document processing Faster payment Increased access and transparency Secure documents with multiple backups Reduction in paper is environmentally friendly
Kentucky	Eliminated about 300,000 pages of paper documents annually
Michigan	 About \$40,000 per project/year savings as compared to paper Contract modification processing from 30 to 3 days

State	Why e-Construction
New Jersey	Estimated \$150,000 savings a year
North Carolina	 Estimated \$1,000,000 annual savings for pilot program of 2 out of 40 construction offices
Dallas Fort Worth Connector Project	Saved \$5,100,000 through e-Construction1 year ahead of schedule





lowa

- > 6 Districts
- 14 Resident Construction Engineer offices
- > 157 full time inspectors
- ➤ 150 cross trained inspectors used

Greg L. Mulder, P.E.

Director, Office of Construction and Materials

Iowa DOT







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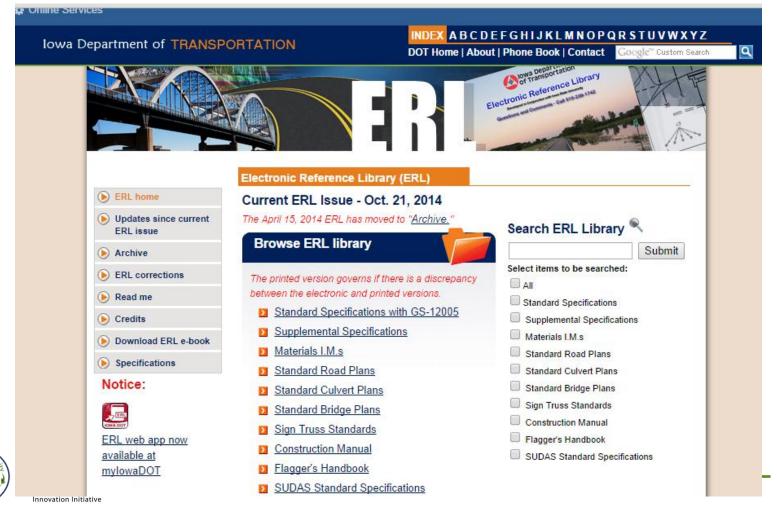
Paperless or e-construction

- What does e-construction mean to lowa?
- To us e-construction meant:
 - Complete as much work as possible using electronic means.
- Piloted 4 contracts in 2014
- 1 small project Bridge replacement
- 1 HMA overlay with CIP recycling
- 2 major interstate reconstruction contracts with 4-5 projects tied together.





✓ Electronic Records Library





Current technology



New technology







The Doc Express Evolution in Iowa

- Partial Pilot Projects in 2010
- Full Pilot Projects in 2011
- Initial Focus was on Materials Certification
- Added Diaries and Payrolls in early 2012
- Changed Diaries to Contract Docs in 2013
- Added electronic signatures in early 2014
- Added a working drawer in 2014





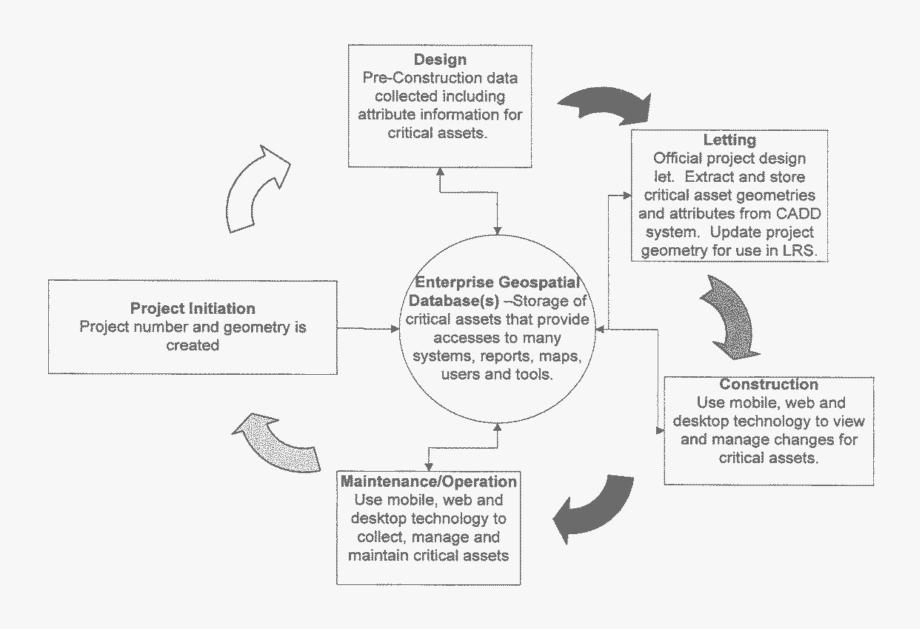
Where are we going

- As let plans from Contracts
- Electronic as-builts in the field (Data only?)
- New electronic shop drawing process (DocExpress)
- Straight line diagraming for project plans?
- 3D project plan vision
- GIS based smart plans?





Geospatial Data Lifecycle – Future Data Inputs and Processes



lowa DOT 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





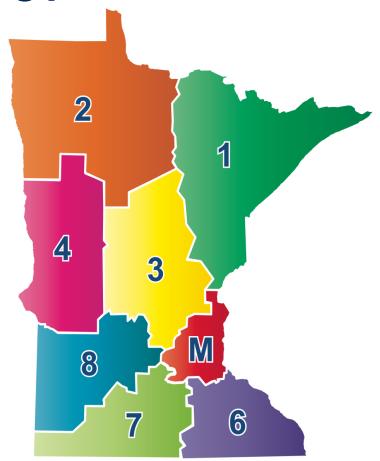
Minnesota DOT.....MnDOT

- Minnesota has 87 counties
- 8 Districts
- 24 Resident Construction
 Offices
- 2013 276 projects awarded
- Award Amount \$1,187 million

Rick Beckes Construction Project Controls Specialist Minnesota DOT







Current e-Construction Practices

- Letting, Award, and Approval
 - e-Plan Room
 - Electronic advertising and bidding
 - Electronic signing of contract
- Contract Administration Electronic
 - Special Provisions and Plans
 - Administration and Inspection
- Contract Administration/Inspection--Projects





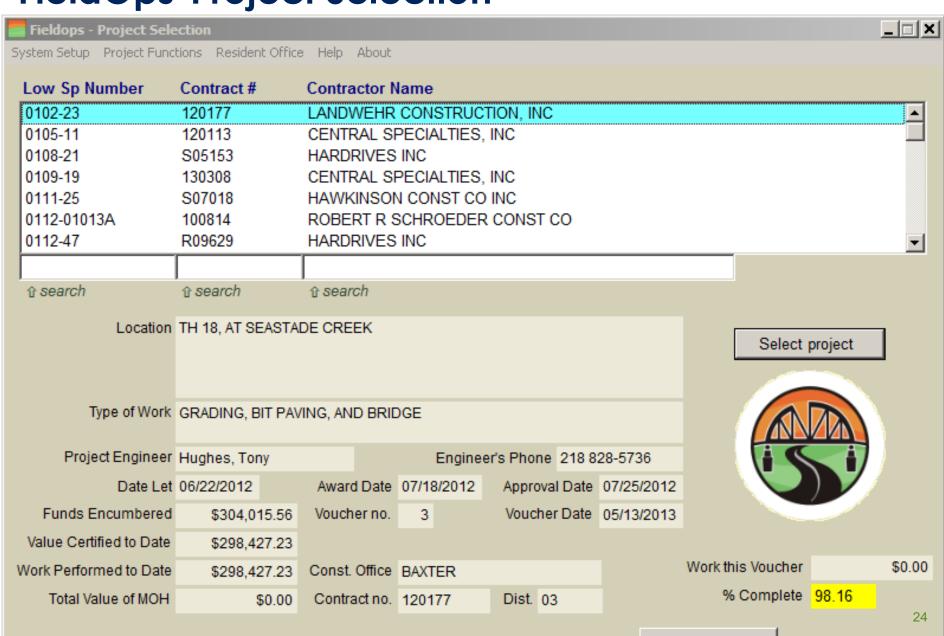
FieldOps

- MnDOT Construction Contract Management System Field Operations Module
- Used by Project personnel to document quantities, create diaries, produce estimates, etc.
- Developed in-house...has evolved over 25 years to it's current version
- Visual FoxPro based program





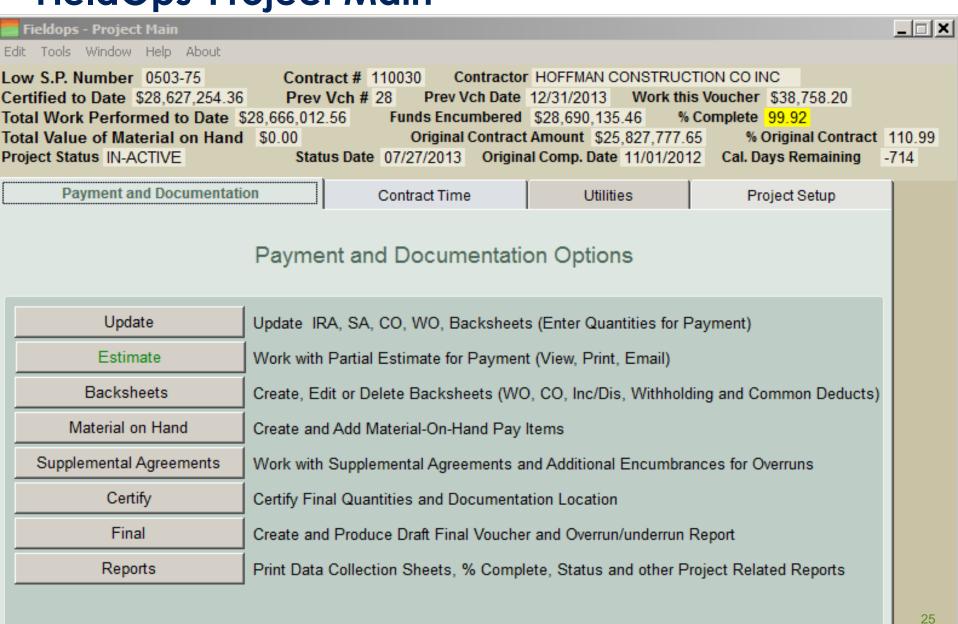
FieldOps-Project Selection



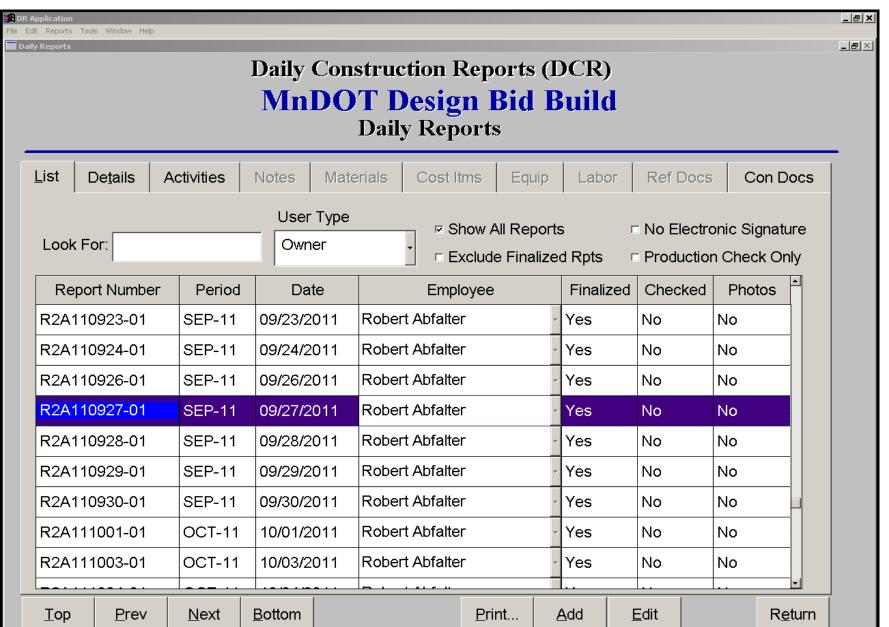
Environment: Network Production

New Download EXIT

FieldOps-Project Main



TRACS-Daily Reports Selection



TRACS-DCR





lit Reports To	ols Window Help		
: Preview - drda	ailyfield_rev.frx X		
	100% 🔽 🔲 🔡 🤑 🥌 y Field Report		
Report Nu	imber: R2A120503-01 Date: 05/03/2012 DOW: Thursday		
Project Na	ame: 0503-75 - TH 23, FROM 682 FEET EAST OF TH 95 TO 1756 FEET WEST OF		
Builder:	Report By: Robert Abfalter		
Weather:	C-am, pm Temp (F): 42 to 71 Prod. Check?	NO	
Activity	2105 - Excavation and Embankment		
	General Contractor Field Notes		
Contracto	r Notes	_	
N/A	ML-1190 No scraper worktoo wet.	Weekly Rpt Punch List Impacts	
N/A	Got word from Derrick Dasenbrock(MnDot foundations), that Hoffman can place another 2' lift of granular borrow on LTP sta 334-340+51will pass along to contractor.	Weekly Rpt Punch List Impacts	
HCC	ML1120Hoffman place another 2' lift of GB over LTP sta 334-340+51. Got the go ahead yesterday.	Weekly Rpt Punch List Impacts	
HCC	GS-1085 Hoffman finish slopes on Glen St. w/backhoe sta 712-727+00.	Weekly Rpt Punch List Impacts	
HCC	HSN Hoffman grade out entrances off of TH25 sta 941+29 Rt, 941+50 Lt (city street) in anticipation of being paved.	Weekly Rpt Punch List Impacts	
HCC	GS-1085 Hoffman shape topsoil on Glenn St. sta 720-725+00.	Weekly Rpt Punch List Impacts	
HCC	ML-B1040 Hoffman strip common borrow pit at Barthelemys.	Weekly Rpt Punch List Impacts	
HCC	EC-1120 Hoffman place GB back where the bench had been made to install the CL3 riprap.	Weekly Rpt Punch List Impacts	
HCC	ML-B1050 Hoffman haul suitable from the Barthelemy pit to TH23 WB sta 370-351+55.	Weekly Rpt Punch List Impacts	
HCC	ML-G1030 Hoffman haul suitable to EBTH23 sta 645-665+00.	Weekly Rpt Punch List Impacts	
HCC	Pd 1020- Hoffman complete truck hauling pond suitabe grading to EBTH23 grade sta 520 -560+00.	Weekly Rpt Punch List Impacts	

Primavera P6v8-Enterprise Management

For projects with Critical Path Method (CPM)
 schedule requirement; Contractor's are required to
 build and maintain schedules on MnDOT servers





Minnesota-The Future of e-Construction

- FieldOps and TRACS are in poor technical health (VFP); will be replaced
- AASHTOware Project Construction & Materials 3.0 scheduled to replace FieldOps
- MnDOT will pilot C&M 3.0 on approximately 25 projects in 2015
- Find replacement for TRACS....SharePoint????
- Rover





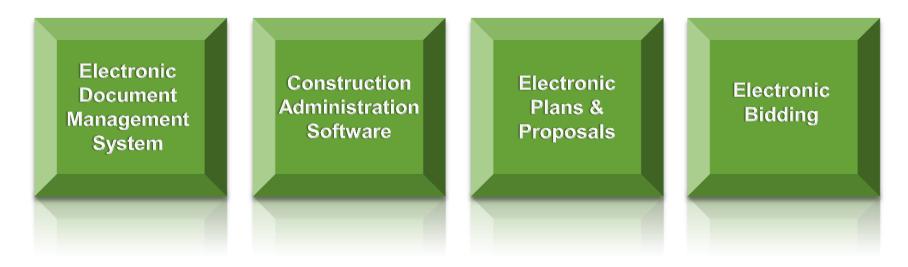
Upcoming Initiatives in Minnesota

- ProjectWise
- 3D Modeling
- Electronic Data Collection (DWRs, prequalification, reporting requirements, insurance, certifications)
- QR Code (for materials, core custody)



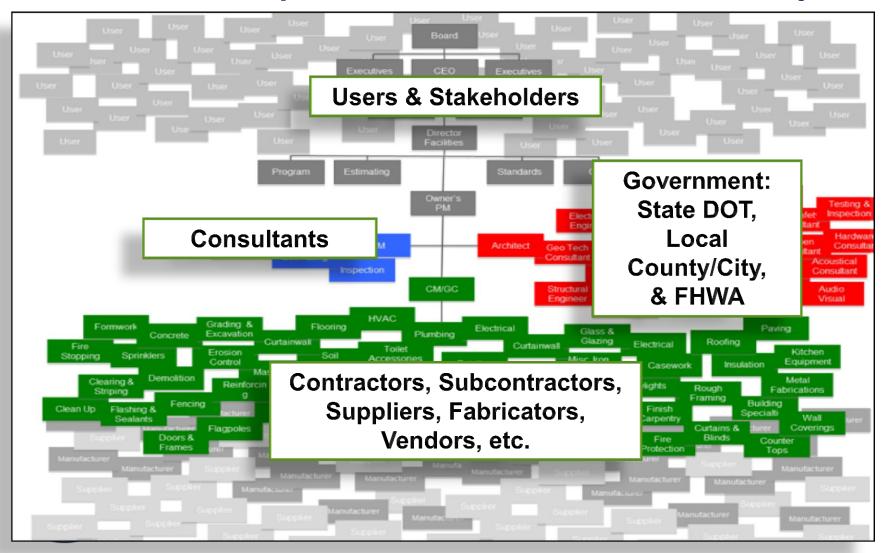


Paperless Components Already in Place at Michigan DOT



Cliff Farr P.E.
Technology and Training Engineer
Michigan DOT

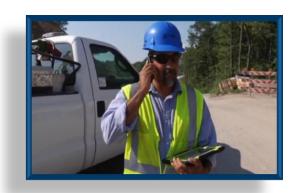
Number of People Involved in a Construction Project



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









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









What Does e-Construction Look Like?

Inspectors

- Efficiency gains
 - Easier data collection with tools like voice data entry
 - Elimination of copying / faxing / scanning and distribution of field forms
 - Faster problem solving with interactive real-time access to statewide experts & partners (FaceTime)
 - Easier access to manuals, plans & project information in electronic format
 - Ability to markup plans on mobile device
- Translates to more time on job site







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)







Results

- Estimated \$12 M annual cost savings
 - Accounts for estimated contractor + DOT Savings
- Estimated 6 million pieces of paper saved annually
- Field staff on jobsite for higher percentage of time
- Increased employee & stakeholder engagement
 - Enthusiasm drove the process
 - Users presented ideas to further enhance process







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







Next Steps



- Address Delivery Tickets
- Enterprise E-Signature Validations
- Broaden the User Base
 - Local AgencyPrograms





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



