<u>e-Construction Paperless Construction Projects</u>

The administration of a project through the design and construction process requires significant communication and documentation of events. This has traditionally required substantial amounts of paper documentation from field staff, contract administration staff, laboratories, contractors, suppliers, inspectors and consultants. The management of this paperwork, including printing and mailing documents, maintaining large file cabinets and file rooms, and the process of obtaining physical signatures on paper not only contributed to volumes of paper documents, but also a very time-consuming process to complete document approvals.

The Michigan Department of Transportation (MDOT) is the first state DOT in the country to pilot and put into production "paperless construction projects." Multiple new technologies being used by MDOT are revolutionizing the contracting process while making it faster and cheaper for agencies and firms to do business. MDOT has completed its pilot projects and has moved to implement production of the new process with a stated goal of 100 percent of its trunkline projects being paperless by October 2014.

"e-Construction" is the term used by MDOT to describe its paperless construction documentation process. With the increased use of digitally encrypted electronic signatures and enhanced document management tools, a more efficient, paperless construction documentation process is now possible. This includes the use of digital signatures by all parties, significant process improvements by laboratories and testing staff, increased automation by field inspectors using mobile devices, and recreating new inspection processes on fillable forms.

The forms are completed electronically in the field by inspection staff and uploaded to secure document management software. This is the only method used to submit documents for e-Construction projects. The software, ProjectWise by Bentley Systems Inc., also incorporates new automated workflows to help efficiently route documents to the correct reviewer for their electronic approval and digital signature. It can be accessed by project contractors, engineers, suppliers, fabricators, testing personnel and inspectors.

This open and transparent document management system has significant benefits for project delivery. It virtually eliminates "lost" documentation and traditional claim conflicts involving document submittal or approval for a project. If documentation is missing for a project, it is readily apparent and leads to better project audits and increased availability of project documentation to all parties. The document management software is available free of charge to the project team, as MDOT has chosen to pay the enterprise software license for the parties involved. Users can access project documentation on their computers through a locally installed software version of ProjectWise Explorer or they can view documents from remote locations on mobile devices through a web portal or a dedicated iPad application.

Combined with the increased use of mobile devices and other technology, the entire construction administration process can now be completed without paper documentation. For those documents still received in the field in paper form, inspectors are using applications on their mobile devices to scan documents into a PDF and then digitally sign the documents. Many more documents have been converted into fillable forms for easier data entry in the field and faster submission directly into ProjectWise from mobile devices. Applications that use the GPS feature of devices to plot the inspector's current location on geo-coordinated PDF construction plan documents also are being tested, allowing both inspectors and the general public to gain a better understanding of where they are and what they are looking at on project plans. Additionally, some inspectors are using applications allowing them to fill out electronic forms with voice recognition, edit PDF plans in the field, and even obtain light metering information for night work. In addition to these "apps," staff members also have access to the full range of Microsoft Office suite of software and office network file drives via a secure CITRIX connection from their mobile devices.

The e-Construction process has accelerated the entire decision-making process, allowed for faster project delivery and significantly reduced costs. Additional benefits include improved communications and partnering and greater opportunities to perform parallel work activities.

e-Construction?

- *Paperless construction documentation*
  - *Document management software accessible to all stakeholders*
  - *Construction documentation process improvement*
- *Mobile devices in the field and for lead engineers and inspectors*
  - *Electronically capturing construction data*
- *Mandating use of digitally encrypted electronic signatures*
- *Innovative training/manuals/instructions*

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)*

Contract Payment Paperwork

What Does e-Construction Look Like?

Engineers

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