



Connecticut DOT

Number: CB-2016-2

Bureau of Engineering and Construction

Date: April 15, 2016

CONSTRUCTION BULLETIN

Construction Administrator

eConstruction

Over the past generation, technological advances in hardware, software and communications have changed the way we live our lives and interact with each other. Due largely to the rise of the internet, newspapers and magazines are no longer the primary source of information for most people. Other industries, such as book selling, music distribution, telecommunications and travel, have been forever changed by technology and new ways of doing business. Even the retailing landscape is being reshaped by on-line marketplaces like Amazon and Ebay. In today's world, the industries and organizations that embrace change and harness technology for business purposes will be successful and outperform others.

Compared to other industries, the construction industry has been relatively slow to adapt to new technologies. Without a doubt, computers, email and cell phones are an integral part of how we conduct business. Some of our projects also utilize CPM schedules, electronic document control systems and digital modeling - but those projects are the exception rather than the rule. Despite the many technological advances that have taken place, our business of managing and overseeing heavy/civil projects largely remains a paper-driven system. Plans, specifications, correspondence, contractor payments, change orders and almost all of our project documentation exist in final form as a hard copy paper document. As a result, we have filled an entire warehouse at Pascone Place with boxes and boxes of paper from past projects.

About a year ago, the Federal Highway Administration, (FHWA), announced an eConstruction initiative as part of its Every Day Counts – 3 Innovations. The goal of the FHWA eConstruction initiative is to replace paper driven systems with technology tools to improve workflow, thereby saving time and money. The Department has expanded the FHWA goal to include a broad array of technological innovations to streamline project administration and improve operational efficiency.

For the past year or so, Office of Construction (OOC) staff, led by Domenic LaRosa and Christopher Angelotti, has been working with our colleagues in AEC Applications and the Office of Information Systems to develop and pilot several eConstruction enhancements to our current procedures and business practices. The enhancements currently under development and review include:

1. **Expanded use of ProjectWise** – Most of us are probably familiar with ProjectWise as a document storage system widely used by the Engineering staff. ProjectWise is a powerful cloud-based tool capable of managing and storing a vast amount of information and data. In the near future, ProjectWise will be used for archive storage of most of the project documents we currently store in hard copy form. However, ProjectWise is much more than just a file cabinet. In addition to archive storage, we will be using ProjectWise to streamline some of the things we do, such as:

- Removing project specifications, permits, addenda and similar documents from the hard-copy signed contract. These documents will be stored on ProjectWise and referenced in the much slimmer hard copy contract. Both Department and Contractor staff will have access to the contract information on ProjectWise. This change will be implemented when final approval is received from the Office of the Attorney General which is expected in the next several weeks. The typical hard-copy contract will be about 100 pages after this change is implemented. Printed copies of any of the referenced documents will remain available to those who prefer hard copies.
- Allowing Contractors to make electronic submittals for working drawings and shop drawings through ProjectWise. Each District will be undertaking a pilot project this construction season to evaluate the feasibility of using ProjectWise for this purpose.

Overall oversight and administration of ProjectWise will remain the responsibility of the AEC Applications group, however, the Technology Coordinator in the Office of Construction will coordinate Construction Division specific processes, folder configuration and folder access. Training and support will be provided to all staff as we move forward. A Construction Directive will be issued soon addressing the use of ProjectWise on our construction projects.

2. **Tablet Computers** – It is our long term goal to put a mobile computing device in the hand of every inspector and supervisor in the OOC. These mobile devices will permit remote access to ProjectWise, Outlook and SiteManager allowing most of us nearly the same access on a mobile device that we currently have on our desktop computers. The tablet computers will be combined with a docking station and monitors at your assigned desk so that workstations are flexible and powerful. We have taken delivery on the first 60 tablet computers and should begin distributing them to staff in 4-6 weeks. The field office specification has also been modified such that tablet computers for inspectors will be provided at the start of every project.
3. **Electronic Signatures** –Digital signatures have been used on Contract plans since 2011. Electronic signatures have also been used sporadically by other staff in .pdf and scanned documents. Connecticut General Statutes allow for electronic signatures provided there is a policy governing their use. A Construction Directive CD-2016-1 was issued April 6, 2016 allowing use of electronic signatures.

A related matter concerns digital signatures, which are similar to electronic signatures except that there is a verification process documenting the authenticity of the signature. Successful pilot projects have been run for Consultant Agreements and Construction Change Orders using the DocuSign software package. Additional information will be forthcoming on digital signatures.

4. **GPS Technology** – Several projects have piloted GPS technology over the past several years. The obvious benefit of GPS technology is it puts a surveying-type device in the hands of an inspector. We learned from the pilot projects that GPS technology is a powerful tool, but it should not be used in situations requiring a detailed survey such as project control survey, ROW layout, bridge seats, etc. Further, we need to be careful how it is used on our construction projects, particularly as it relates to contractor payments. For these reasons, it has been determined that there will be a proficiency requirement that inspection staff must satisfy before using GPS devices. There will be limitations on the use of GPS devices depending on the user proficiency. Updates to the Construction Manual have been drafted which describe these requirements in detail. The draft procedures will be further tested during this construction season before incorporation on a larger scale.
5. **Digital Modeling** – AEC applications is leading the effort to develop design standards for the delivery of three dimensional design models. As currently envisioned, project designers will be required to deliver a three dimensional digital model with the final design plans. These digital models will not only be shared with the inspection staff, but also with our Contractors. Updates during the construction phase will also be required. Digital modeling will greatly benefit our construction projects, when fully implemented. The benefits include; simplified earthwork computations, enhanced public information opportunities, stakeless construction and automated machine controls.

The eConstruction initiative is supported by Department Senior Management as well as the FHWA. There is also a State Transportation Innovation Council, (STIC), charged with identifying critical needs, finding best solutions and getting them into practice quickly. The Department's progress, with respect to the technological innovations under the eConstruction umbrella is reported to the STIC, not only for validation, but also for strategic planning purposes.

Consistent with the goals and priorities established by the STIC, the OOC has established a Technology Steering Committee. The Technology Steering Committee is made up of the District Engineers, AEC Applications, and OOC staff. The initial charge of the Technology Steering Committee is to review technology enhancements associated with eConstruction. The committee also assists with prioritizing and implementing those enhancements. Moving forward, the Technology Steering Committee will function as a clearing house for the review and implementation of future technological advances. OOC staff is encouraged to bring proposals and ideas related to technology to the Technology Steering Committee for consideration.

In the coming weeks and months OOC field staff will begin to see and feel the effects of the eConstruction initiative. Mobile tablets and online resources will be more readily available which will allow projects and inspection staff to be connected with better access to information. Project staff will no longer have to carry around plan sets, specifications or working drawings (unless they want to) because all these documents will be available on a connected tablet computer. Finally, inspectors will no longer have to return to the project field office to complete their Daily Work Report. The tablet computers will include a VPN connection to SiteManager which will allow direct access anywhere there is a cellular or Wi-Fi signal.

Thank you in advance for your participation and cooperation with the eConstruction initiative.