

Application Note



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Federal Highway Administration

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E-TICKETING

The sixth round of the Every Day Counts (EDC-6) initiative selected electronic ticketing (e-Ticketing) for rapid deployment among highway agencies to enhance work zone safety, improve quality, and realize cost savings through digitalization.

Highway construction projects generate massive amounts of valuable data that historically were communicated via paper. Paper tickets to track the delivery of materials at a construction site is one such source of data. The emergence of electronic technologies on highway construction projects has made the paper-based processes outdated, inefficient, and cumbersome. Highway agencies are integrating paper processes into electronic and digital workflows. Earlier rounds of EDC successfully promoted the deployment of e-Construction technologies.

E-Ticketing is a market-ready digital innovation that automates the recording and transfer of information and quantities in real-time, in lieu of paper tickets, as materials are moved from the plant to the site. E-Ticketing simplifies handling and integration of materials data into information systems for acceptance, payment, and source documentation. The overarching goal of the EDC-6 initiative is to facilitate the adoption of e-Ticketing by state and local highway agencies.

FHWA initiated peer-to-peer exchanges to deliver technical assistance to highway agencies exploring implementation of e-Ticketing. The peer-to-peer exchanges provide opportunities for an exploring agency to learn from the experience of states that have successfully adopted e-Ticketing. The peer-to-peer exchanges facilitate interactions among participating agencies to share effective practices and address challenges and barriers relating to e-Ticketing implementation. The discussions focus on various critical success factors, including a business case, planning for pilots, field readiness, stakeholder engagement, data management, and specifications. The peer-to-peer exchange facilitates dialogue with stakeholders and decision-makers on the next steps of implementation.

IMPLEMENTATION OF E-TICKETING IN VIRGINIA

INTRODUCTION

The Virginia Department of Transportation had experience with e-Ticketing, conducting approximately 10 pilot projects in a single district that used one contractor/supplier fleet management solution to receive e-Tickets. This approach, however, presented several challenges. Because VDOT field inspectors were required to have multiple login credentials—one for each solution that was selected by a contractor—the process was cumbersome and made VDOT reliant on material vendors. Additionally, training inspectors to use multiple software solutions proved to be difficult and VDOT wanted to ensure a seamless statewide adoption of e-Ticketing.

To address these challenges, and after evaluating existing resources and considering in-house web portal development, VDOT chose to deploy a commercial off-the-shelf (COTS) product to receive e-Tickets. This solution would simplify the process of managing e-Tickets for VDOT personnel and allow for broader statewide adoption of e-Ticketing.

VDOT'S VISION AND SCOPE

VDOT has a vision for its e-Ticketing implementation efforts:

“Develop a standardized, data-centric, e-Ticketing solution that is web enabled, cloud hosted and accommodates all material types that can be acted upon while out in the field, regardless of internet connectivity [wifi or cellular] and that enables Material Providers to use any software they choose; initially including the submission of .pdf tickets.”

And to realize this vision, VDOT has a three-phased approach to e-Ticketing implementation:

1. **Pilot Projects and Statewide Rollout** – The first phase will include comprehensive pilots for asphalt concrete, ready-mix concrete, and aggregates across various districts to evaluate the effectiveness and feasibility of e-Ticketing. These pilots will provide valuable insights on field deployment, allowing VDOT to assess field readiness and make any necessary adjustments and improvements before moving towards a statewide roll-out.
2. **Data integration** – Currently, VDOT uses a web portal that is accessible from the field, with e-Ticketing data hosted in the cloud. In this phase, VDOT will focus on migrating e-Ticketing data from the cloud-based repository to an internal information system, facilitating more diverse usage and maximizing data utilization.
3. **Positive Material Delivery** – In the last phase, VDOT's goal is to have materials received and validated without the presence of on-site personnel within the next five years.

To ensure feasibility, VDOT's scope for e-Ticketing implementation is focused on minimizing disruptions for suppliers. The agency decided to not include components of fleet management in its e-Ticketing implementation. Additionally, VDOT's pilot projects will not dictate requirements for trucks or drivers. The truck drivers will instead need to comply with all necessary requirements set forth by the Virginia Department of Motor Vehicles.

PROCUREMENT PROCESS

In response to the challenges associated with staff using multiple products, VDOT deployed a web portal to receive e-Tickets. The agency evaluated in-house development versus procuring a COTS product and also considered if an existing platform could be leveraged or expanded. One-to-five-year operations and maintenance costs were included, which allowed for development time and testing if in-house development was selected. On the other hand, if a COTS product were selected, VDOT emphasized the need to be aware of all procurement regulations and associated timelines that could impact procurement progress. Finally, VDOT decided to procure a COTS product, offered as software as a service (SaaS) for e-Ticketing.

VDOT then encountered significant procurement challenges while implementing a COTS product for piloting purposes. In March 2022, the agency shortlisted a COTS vendor and intended to conduct e-Ticketing pilots using the product on a cost-free trial basis. However, VDOT discovered that it was unable to accept a free demonstration of the software and that a formal procurement process was required. Subsequently, a request for proposals was released in June 2022.

Additionally, the Virginia Information Technologies Agency (VITA) required a mandatory assessment of the COTS product for compliance and security. In accordance with Virginia's laws, VDOT must obtain written approval from VITA through the Enterprise Cloud Oversight Service (ECOS) before finalizing the procurement with a SaaS solution supplier. The ECOS assessment—a rigorous process that can take several months to complete—was completed in December 2022.

Terms and conditions were negotiated for another three months. As a result, the procurement process was delayed, and the web portal was not implemented as quickly as VDOT hoped. Finally, the web portal solution was successfully deployed for pilot projects in March 2023.

PLANNING FOR PILOT PROJECTS

To plan for the piloting program and ensure its success, VDOT conducted a thorough field readiness assessment, stakeholder engagement and communications, a business process review, and specifications development.

Field Readiness – VDOT's comprehensive assessment for field readiness involved several considerations. The agency ensured that all field inspectors were equipped with iPads and essential applications and explored the

possibility of installing boosters to enhance spotty connections—while also considering the need for offline capability in mobile applications (the pilot projects will help determine how often connectivity is an issue). VDOT also assessed the necessity of customer support resources, such as 24x7 coverage, a hotline, a support ticket system, and global email support.

Stakeholder Engagement and Communications –

VDOT prioritized outreach and partnership to maintain effective communication with stakeholders throughout the pilot planning process. The agency was proactive, reaching out to colleagues at industry cooperative meetings to discuss e-Ticketing implementation and seizing opportunities to speak at various conferences and association meetings. VDOT sent letters to all suppliers, giving advance notice that a prime contractor might contact them to gauge their interest in the e-Ticketing pilot program. Additionally, VDOT created a one-page fact sheet that summarized essential details about the pilot program and fostered a shared understanding among stakeholders. The fact sheet included a program overview, benefits, timelines, a description of the web portal, supplier requirements, and a flowchart describing the implementation process. To gather additional input and further improve communications, an informal e-Ticketing pilot program task force was also established. The task force consists of VDOT Construction and Materials Divisions personnel, along with industry colleagues, suppliers, contractors, and trade associations.

Business Process Review – To identify areas for improvement, streamline workflows, and address any bottlenecks, VDOT conducted a business process review of all activities involving key players, including material suppliers, contractors, VDOT inspectors, and the VDOT materials division. The agency also reviewed the flow of ticket data, from supplier point-of-sale software to the cloud, through the mobile apps of field inspectors, and finally to VDOT systems.

Specifications Development – VDOT developed a draft specification for e-Ticketing pilot projects that defines the requirements for an e-Ticketing system, data transmittal, and data attributes.

PREPARING FOR PILOT PROJECTS

VDOT's extensive preparations for e-Ticketing pilot projects include supplier connections, a detailed report to the pilot program's task force, and evaluations of the project team and suppliers.

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Supplier Connections – The COTS vendor is responsible for both maintaining a website and facilitating the training of personnel involved in a pilot project. Materials suppliers are required to collaborate directly with the vendor to establish and test web portal connections. This involves testing data retrieval from the POS scale and secure data transmission to the web portal. During the pilot, robust tracking and security measures are essential to safeguard data from unauthorized access and maintain data integrity. There is a thorough evaluation of the software's capability to handle diverse data types, such as relational data, photos, and PDFs.

Task Force Updates – VDOT will periodically update the task force on e-Ticketing pilot projects. This may include an assessment of software performance, lessons learned, and recommendations for statewide implementation. VDOT also conducts periodic meetings with the task force leaders to discuss the status of pilot projects, including progress, policy changes, specifications, business processes, challenges, and any necessary adjustments. To support continual improvement, VDOT surveys key participants of the pilots.

VDOT Project Team and Supplier Evaluations – With a focus on roles and responsibilities, these evaluations thoroughly assess the preparedness of the project team and suppliers for pilot projects. The evaluation includes business processes related to materials receipt and ticket acceptance, field communications, data handling, and decision-making procedures. The purpose is to ensure that both the VDOT project team and the supplier's team are fully equipped and capable of successfully executing the pilots.

NEXT STEPS

While VDOT has completed 33 pilot projects that primarily focused on asphalt during the past year, it is actively working towards expanding its scope to include concrete and eventually aggregates. Moving forward, VDOT plans to proceed with Phases 2 and 3 (data integration and positive material delivery).

Integration with AASHTOWare® Project™ will be an essential component of Phase 3. In this phase, VDOT will establish a groundbreaking interconnection between its internal project and design systems and external systems of e-Ticketing vendors. This technological foundation creates a roadmap for a fully automated data exchange system with extensive capabilities, including the use of real-time construction data.

