Application Note

U.S. Department of Transportation
Federal Highway Administration

FHWA-HIF-24-027

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 The emergence of electronic technologies on highway construction projects has made the paper-based processes outdated, inefficient, and cumbersome.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 e-Ticketing implementation. 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 related 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 WASHINGTON

OVERVIEW OF E-TICKETING IMPLEMENTATION

The Washington Department of Transportation (WSDOT) has long recognized the need for a contactless solution to address safety hazards related to workers collecting paper tickets from delivery trucks, and the COVID-19 pandemic (2019-2022) further increased the need for contactless delivery. Together, these drivers pushed WSDOT to make significant changes to the handling of paper tickets and transition to electronic tickets. The use of e-Ticketing and digital signatures increased during this period.

To facilitate this transition, WSDOT issued a construction bulletin in 2021 that allowed contractors and material suppliers to use any approved e-Ticketing solution. Contractors were allowed to select their preferred e-Ticketing solution as long as the system complied with the Standard Specifications 1-09.2(1) for truck weight measurement and 6-02.3(5)B for concrete delivery. Contractors currently provide e-Tickets for all weighed materials with the option to use electronic formats like photo images of paper tickets, portable document format (PDF), and digitalized tickets. Figures 1 and 2 present sample e-Tickets for bituminous mixtures.

To date, WSDOT has depended on contractor fleet management solutions to access and collect e-Tickets. However, the agency has also been accepting tickets in electronic formats that are not digitalized for further manipulation by information systems.

Figure 1. Sample Fleetwatcher e-Ticket on WSDOT Project

Source: WSDOT

Figure 2. Sample HaulHub e-Ticket on WSDOT Project

Sep 14 3:11 PM PDT   Ticket Number **5528587**   Ticket Status **Delivered**

1/12 tickets

	Supplier	Origin **10X PORTABLE ASPHALT PLANT**

Contract Number	Contractor	Job Name **21784-WEN STRATEGIC PVMT PRES 2021**	Job Number **21784**
			Customer Name

Truck **R75P**	Max GVW **30000**

Product Description **3/8"HMA64-28**	Product **1712**	Product Code

Supplier Comments: - -

Load Number **11**	Daily Total **292.05**	GROSS **35.14** TARE **20.86** NET **9.28**	Weighmaster

DOT Plant Temp NA DOT Field Temp NA Waste 5.00	Status **Accepted** **Sep 14 4:13PM**	Reject Reason/Notes **4:13PM truck arrived onsite I-90 EB RT lane 4' wide ending MP 139.41** group 1

Contractor Field Temp NA Contractor Plant Temp NA Contractor Waste NA	Contractor Inspector **N/A** Contractor Signed At **N/A**	Contractor Notes

Source: WSDOT

ORACLE PRIMAVERA UNIFIER IMPLEMENTATION

Once the e-Ticketing portal becomes operational, WSDOT will integrate e-Ticketing data into its Oracle Primavera Unifier environment. Over the last four years, WSDOT has been engaged in updating its construction management software to Unifier, which the agency now considers institutionalized. Prior to the Unifier implementation, WSDOT relied on multiple legacy systems for construction project management.

These fragmented and outdated legacy systems, prompting WSDOT to seek a solution that would simplify operations and meet new tracking and reporting demands. The legacy systems had become obsolete and were not integrated, prompting a need for standardized processes and workflows. In response, WSDOT chose to migrate to Oracle Unifier for its reliability, adaptability, scalability, and robust capabilities. Oracle Unifier addressed issues related to simplifying operations and tracking and reporting by streamlining processes, enhancing contractor access, and centralizing contract information and final records management. With Oracle Unifier, WSDOT found a comprehensive project lifecycle management solution

that spans various project phases and provides governance, general documentation, workflow management, capital planning, project delivery, cost control management, forecasting, facilities and real estate management, operations and maintenance, and dashboards and reporting. Currently, Unifier is actively supporting 219 construction projects and is being used by 1,233 WSDOT end-users and 339 external users representing 66 companies.

The Unifier Implementation project began in April 2020 with pilot deployments in the construction project offices of each region. Capabilities were added within Unifier, including processes for submittals, daily reports, transmittals, and more, with integration established with systems such as the Construction Contracts Information System (CCIS) and the Contract Administration and Payment System (CAPS). In 2021, the Unifier Expanded Deployment (UED) project began by introducing four dedicated Project Management and Reporting System (PMRS) regional support positions and significant enhancements, including upgrades to Field Note Records and Submittals, a version update for Unifier, eBidding requirements gathering, and migration to the Oracle Cloud. In 2022, transformative changes continued with the migration of Unifier and P6, the addition of new PMRS support positions, configuration enhancements, and development of business requirements to CCIS, CAPS and Construction Audit Tracking System. Looking forward to 2023, substantial enhancements are anticipated for Unifier in construction administration, focusing Estimate and Bid Analysis System (EBASE), e-Bidding, and the integration of Bluebeam to enhance overall efficiency. In 2023-2024, WSDOT plans to implement or update several e-Construction applications, including Materials Acceptance and Testing System and e-Ticketing.

FIELD READINESS

WSDOT aims to establish a statewide e-Ticketing system that accommodates metropolitan and rural areas, ensuring consistency, auditability, and inspector and supplier acceptance. As part of the pilot, WSDOT examined the two prerequisites for statewide implementation: the rollout of mobile devices and internet connectivity.

All WSDOT staff members have laptops, and to date, the agency has introduced 200 iPads on a pilot basis. However, iPad usage has not met expectations because of compatibility challenges with the Unifier application. WSDOT has been collaborating with Oracle to address iPad support.

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In urban areas, signal strength is typically good but sporadic in isolated zones. The offline capabilities of an e-Ticketing mobile application would sufficiently handle intermittent coverage in urban areas. Conversely, cellular signal strength is weak with dead zones in some regions, especially rural areas of the state. To mitigate these issues, WSDOT is currently piloting Starlink® Mobile Government Service, a low-earth satellite internet service provider, and field internet tests have shown download speeds up to 110 Mbps and upload speeds of 10-15 Mbps. The agency is open to partnering with a volunteer contractor interested in installing a cell phone booster on a paver.

DATA MANAGEMENT

Currently, all e-Ticketing data are entered manually. The implementation of a web portal would allow WSDOT to receive tickets electronically from any pre-authorized contractors and material producers regardless of their business size or share of State DOT work, or the fleet management solutions they use.

WSDOT has included data-related requirements for e-Ticketing in Section 1-09 "Measurement and Pavement of WSDOT 2023" Standard Specifications for Road, Bridge and Municipal Construction. Section 1-09 specifies the information that must be included on e-Tickets, how the tickets should be transmitted, and the timeline for providing necessary documentation for reconciliation and payment. Section 1-09 also requires contractors to submit daily summary reports electronically in a non-editable file format, either at the end of each day's hauling operations or as determined by the Project Engineer. The summary report must include detailed information for each material and bid item, ensuring accurate record-keeping and transparency for payment calculations and quantity measurements. The e-Tickets and daily summary reports become permanent records stored on WSDOT's electronic content management system.

FUTURE OF E-TICKETING

WSDOT is working to modernize its construction management tools. This process started with the adoption of Oracle's Unifier and continues with finding additional ways to leverage Unifier to improve overall contract management. Adopting a portal system to capture e-Tickets will enable WSDOT to collect data once and use it in a variety of ways. WSDOT is evaluating consulting firms that will help deliver e-Construction Phase II. At the conclusion of this phase, WSDOT will have adopted a web portal and further advanced its e-Ticketing efforts. By 2024, the agency plans to integrate e-Ticketing, e-bidding, and materials testing-related systems with Unifier.

Overall, WSDOT's vision for e-Ticketing is focused on safety, inclusion, and efficiency. WSDOT is in the process of selecting an e-Ticketing approach and acquiring a solution. The agency has been addressing implementation requirements and solutions, including establishing data criteria, selecting pilot projects, evaluating organizational readiness, and incorporating data. WSDOT does not expect to be prepared to receive data in Unifier by the 2023 season. In the meantime, the agency has been cultivating internal support and collaborating with the highway construction industry to enhance communication, share forthcoming plans, and tackle challenges.