

# Application Note



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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 The emergence of electronic technologies on highway construction projects has made the paper-based processes outdated, inefficient, and cumbersome.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 to implement 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 AT NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

## OVERVIEW OF E-TICKETING IMPLEMENTATION

North Dakota Department of Transportation (NDDOT) began piloting e-Ticketing in areas throughout the state beginning in 2018. The agency's first attempts identified some minor issues that it needed to address, including unexpected or heightened costs, cellular coverage issues, and set up and training. After these initial experiences, NDDOT concluded that e-Ticketing had potential but that the agency needed to investigate whether the process was the right fit at that time. In 2019, NDDOT began speaking with other state DOTs that were also conducting e-Ticketing research to see what was working for them. Staff drafted e-Ticketing special provisions (SP) but was hesitant to apply it until the agency had a solid understanding of the benefits of e-Ticketing.

In 2020, the agency viewed many vendor presentations as the move to contactless delivery of tickets spurred many in the industry to come up with solutions. NDDOT added e-Ticketing to two projects (one asphalt and the other millings/aggregates) through change orders in the 2021 season. The agency selected project locations with good cellular coverage and volunteering contractors for the two pilot projects.

Earlier, in January 2021, NDDOT staff met with Federal Highway Administration (FHWA) North Dakota Division to discuss current conditions around e-Ticketing in North Dakota and to identify opportunities to advance e-Ticketing in the state. As a result, in March 2022, NDDOT hosted an e-Ticketing peer exchange to meet representatives from other states in various stages of e-Ticketing implementation. NDDOT staff leveraged many of the ideas from the exchange and formed a plan to move forward. It began to look into projects that would be suitable first candidates for an e-Ticketing SP in all eight of its districts. The agency focused on asphalt, concrete, and aggregates projects in locations with good cellular coverage to try to limit the growing pains that contractors and inspectors would have to overcome. It also decided to increase the number of projects that would require e-Ticketing in the coming construction seasons to maintain e-Ticketing implementation momentum.

## PROJECT INFORMATION

The initial 2018 pilot projects occurred in July and August in the Devils Lake district and used e-Ticketing for asphalt. Multiple smaller projects also used e-Ticketing, but the main project was on Highway 281.

## PROJECT INFORMATION, CONT.

NDDOT engaged in two e-Ticketing projects in 2021. In July, a project in the Bismarck district on I-194 involving millings/aggregates, used e-Ticketing. The contractor for this project was Knife River. This project had a geofence, a virtual geospatial boundary, established around the project limits. As a result, the inspector could not digitally find the exact location where the loads were actually dumped, but only from where they entered the project. The inspector visually verified material dumps.

A second e-Ticketing project in 2021 also occurred in July in the Williston district on US Highway 85. This project was for asphalt e-Ticketing, and the contractor was Knife River.

The most recent project occurred in September 2022 in the Grand Forks district on Highway 1. The material for this project was asphalt, and the contractor was R.J. Zavoral & Sons.

## IMPLEMENTATION PLANNING

NDDOT communicated with its industry partners stating that it would be conducting a non-committal trial phase of e-Ticketing. The agency also made its SP available. Basically, if a contractor had an e-Ticketing system that it was interested in using, it was welcome to do so on one of NDDOT's projects. If for any reason the process was not working, either the contractor or NDDOT could end the trial and revert back to the sole use of paper tickets. This was made clear at the pre-job meetings. NDDOT had one contractor that had recently acquired the Fleet Watcher system and was interested in using on an NDDOT project. The agency agreed; however, it used paper tickets as the delivery documents, and the contractor was able to successfully demonstrate that the system worked. The contractor provided NDDOT district staff with the means to access the system to monitor the process.

## FIELD USE AND INSPECTION

The tickets for NDDOT projects were generated at the plants. The projects were all located in the areas with strong cellular coverage, so the transmittal of tickets occurred through the contractors' systems that the inspectors could access via iPads used in the field. The inspectors were then able to visually verify that the trucks had arrived and were dumping in the correct locations.

## DATA MANAGEMENT

The e-Tickets were used in conjunction with paper tickets to allow comparisons and were not the dedicated source of load information for the projects. For project where e-Tickets were to be used exclusively, the data would be converted to a daily haul summary and stored with the project records within NDDOT's construction automated record system (CARS) system as a .pdf file.

## ANTICIPATED BENEFITS, STRENGTHS, AND CHALLENGES OF IMPLEMENTATION

NDDOT has had tremendous buy-in from its agency personnel including management, the Construction Division, and the districts. NDDOT anticipates some connectivity challenges in the future, but the agency understands that the industry is growing and adapting to these challenges and tools will eventually be available to adapt. The agency intends to advertise the benefits of e-Ticketing once it starts seeing positive results.

NDDOT has also had good buy-in from a number of its contractors. Many of them use e-Ticketing systems in neighboring states and are eager to maximize the value of their purchases by using the system in North Dakota. Some contractors are not as far along, and NDDOT understands that there may be some challenges in getting them adapted to e-Ticketing and is working on outreach with the Associated General Contractors of America (AGC) to address some misconceptions and allow contractors to voice their concerns about implementation.

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*"We did do a couple jobs over the last two years mostly this was just e-tickets (Paper less ticket) and we seem to have good feedback from the dot and we had very little to no problems ourselves just cell service once in a while but with some offline stuff now that seems to be working a lot better also.*

*So, from my opinion I think it seem to be working well for now and it is nice to have you guys get some input from industry." – NDDOT Contractor*

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**FUTURE OF E-TICKETING**

NDDOT has found that even with e-Ticketing practice, some things may not work as well as it would like, and patience and ongoing learning are required. However, NDDOT believes that clear communication and the determination to succeed will eventually make e-Ticketing part of the norm for the department.

For the upcoming construction season, NDDOT has identified projects in each district where it will implement e-Ticketing. The initial list included 15 projects and is now up to 18, so it is clear that the districts are still identifying projects that they think will be a good fit. The agency will take any lessons learned and apply them to the next season where it plans to expand the number of projects. NDDOT's overall goal is to implement e-Ticketing on virtually all projects by 2026; however, the agency is aware that gaps in cellular coverage may require it to modify its vision or find ways to work "offline" without losing any data.

