Heavy Equipment Based Connected Work Zone

By Delaware Department of Transportation

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Benefits Statement

By integrating contractor equipment telematics into smart work zones, Delaware Department of Transportation (DelDOT) and partner agencies have enhanced roadside safety with automated, real-time worker presence alerts, reducing risks to both crews and drivers. The system minimizes staff workload through automation, saving time previously spent on manual updates. It also reduces costs by using existing data, streamlining inspections, and preventing miscommunications during implementation. Scalable and standardized across multiple states, the approach improves efficiency and lays the groundwork for broader adoption, helping protect lives, accelerate workflows, and cut expenses across roadway projects.

In this case study you will learn:

1. How DelDOT enhanced work zone safety by integrating digital data—especially heavy equipment telematics—into consumer apps, reducing risk for workers and drivers.
2. How DelDOT enhanced efficiency by automating work zone updates to deliver accurate, real-time information without overloading project teams.
3. How coordination with OEMs, mapping providers, and industry groups to address data inconsistencies promoted scalable, standardized solutions.

2025 TSMO Award Winner for Emerging Practices and Technologies

NOCoE

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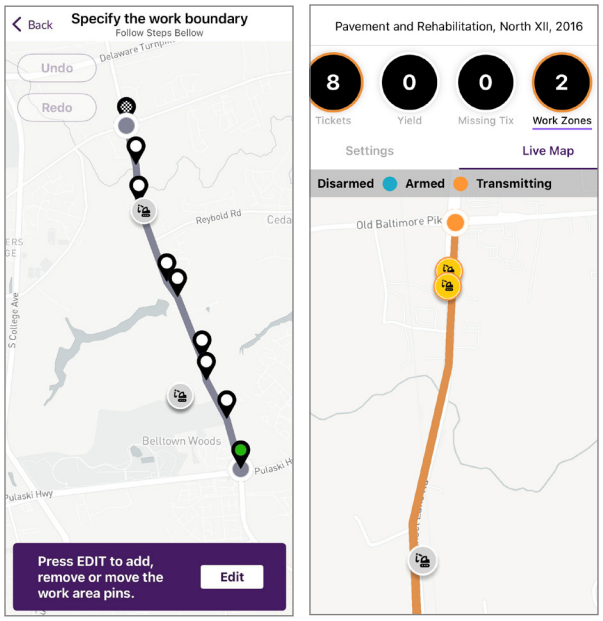
BACKGROUND

With roadway workers and inspectors operating just feet from high-speed traffic—and driver distraction on the rise—traditional safety measures are no longer enough. Work zones remain some of the most hazardous environments on our roadways, posing serious risks to both construction crews and the traveling public. In response, transportation agencies are implementing technology-driven solutions to reduce these interactions, better inform drivers, and improve overall roadway safety—laying the foundation for what are now being called “Smart Work Zones.”

However, many efforts aimed at developing smart work zones have primarily focused on Intelligent Transportation Systems (ITS) and Temporary Traffic Control (TTC), overlooking the wealth of digital information already being collected on construction sites. While ITS and TTC remain important, leveraging existing digital data streams, including, notably, equipment telematics from contractor heavy equipment, could serve as the critical missing link to efficiently and accurately capture real-time work zone statuses. By tapping into this readily available data, DelDOT has been able to quickly implement connected work zones in a manner that places minimal burden on staff while immediately enhancing safety for both the traveling public and construction personnel.

Previous approaches often buried notifications within agency-focused systems, and despite advancements in technology making smart work zones easier to set up, they still created substantial burdens on project teams. This initiative, however, emphasizes delivering consistent, reliable, and automated data directly to consumer mapping applications—not just at the state level, but nationally—as demonstrated by DelDOT’s partnership with multiple transportation agencies (Iowa DOT, Louisiana DOTD, and Nebraska DOT). Furthermore, our efforts prioritized minimal direct intervention from project staff, concentrating labor mainly at the project’s onset, and allowing routine, digitally captured data to seamlessly automate daily notifications.



TSMO PLANNING, STRATEGIES AND DEPLOYMENT

Planning for the implementation of this solution began with DelDOT's successful launch of an eTicketing portal. The eTicketing portal succeeded primarily because it streamlined data from multiple disparate databases and platforms into a uniform format compatible with DelDOT's Construction Management Software. Additionally, it served as a data gateway, ensuring both suppliers and DelDOT accessed only information directly relevant to their specific projects.

Building upon the success of the eTicketing portal, DelDOT and its partners explored additional opportunities to leverage similar technology for integrating other digital job-site data sources. Recognizing the widespread adoption and extensive data availability of equipment telematics used by contractors for fleet management, our team identified it as an ideal initial focus area. Although the long-term vision includes utilizing digital data streams broadly to enhance construction and inspection workflows, the immediate and natural priority was enhancing safety in work zones.

DelDOT, in collaboration with its technology partner HaulHub Technologies, quickly moved forward by initiating a proof of concept involving a construction contractor, several Original Equipment Manufacturers (OEMs), and Waze Mobile Ltd. Concurrently, DelDOT engaged additional state transportation agencies to pursue a Federal Highway Administration (FHWA) Advanced Digital Construction Management Systems (ADCMS) grant. This coordinated effort led to the first field demonstration—documented as A Digital Leap in Delaware—in the fall of 2023, coinciding closely with DelDOT's receipt of the ADCMS grant.

With the additional funding provided by the ADCMS grant, DelDOT expanded the program throughout 2024, offering specific work items within construction contracts to incentivize contractors to connect their equipment to the data integration portal. Furthermore, because the grant encompassed multiple state agencies—including Iowa DOT, Louisiana DOTD, and Nebraska DOT—our team was able to engage OEMs and consumer navigation companies on a broader scale, amplifying interest, buy-in, and ultimately, the effectiveness of these safety investments.

Lastly, the near-universal contractor adoption of fleet-management telematics significantly simplified the deployment. The minimal cost to contractors for integration allowed DelDOT to focus grant funds primarily on software development, streamlining data connections, and automating real-time safety notifications.

COMMUNICATIONS PLANNING AND EXECUTION

Communications for this idea were originally focused within the core eConstruction & eTicketing teams, as our goal was to quickly develop the concept in a low burden, but open format that focused on impacts to the construction team while at the same time being mindful of additional uses and integrations for other stakeholders as the concept matured.

Once the initial proof of concept was successful and funding was secured, we engaged internal managers of both active and upcoming projects to add a connected equipment specification to the projects. When adding this requirement, we

held meetings with the contractor, OEM's, OEM Dealers, and HaulHub to establish the limits of our asks and aid in setting up the connection. Internally to the Construction Team, we also focused on training staff on how to create the work zone limits so they could be effectively broadcast through Waze. As we found success in the notifications, we began to connect with DelDOT's Traffic team to discuss integrations which they could benefit from, including knowing when work starts and stops independent of a direct phone call.

As the construction season began winding down, we also shared the successes and learnings of our team by hosting an in-person and virtual peer exchange, attended by 16 states, and 5 technology and OEM companies, all in order to demonstrate how others could immediately benefit from this project.

OUTCOME, BENEFITS AND LEARNINGS

To date, nearly 900 digital work zones have been established within the system, resulting in the automated generation and delivery of over 750,000 automated worker presence events. These events have been distilled into highly reliable worker presence notifications to motorists across the now seven agencies who are beginning to demonstrate the technology. We still have a long road ahead of us for the work we are doing to impact safety outcomes within our work zones, but these notifications are an important and cost-effective step towards changing motorist behavior.

Another major achievement of this initiative is the integration of contractor-owned telematics systems with departmental platforms, now spanning eight OEM and third-party providers. This standardized, scalable setup enables broader adoption across agencies.

Looking ahead, we partnered early with Iowa State University to use this data to also improve inspection workflows, automating activity summaries, quantity tracking, quality control,and asset management, boosting safety while reducing administrative work for inspectors.

Our initial approach to defining work zones was manual plotting. We quickly recognized we would need to move towards an increasingly automated process. With consumer mapping applications already relying heavily on Linear Reference Systems (LRS), we've been refining our system to leverage the LRS data to enable a simplified process while ensuring a low processing error rate for the consumer.

Additionally, we learned that consumer mapping applications vary significantly in their methods of data consumption and their trust in external data sources.

Though our solution was built with integration into the Federal Work Zone Data Exchange, we found that not all consumer mapping providers actively use this source. Consequently, we proactively engaged these companies directly, finding Waze particularly receptive. Moving forward, our objective is to continually demonstrate the accuracy and reliability of our data, encouraging broader adoption among other consumer mapping platforms nationwide.

Another key discovery was that Original Equipment Manufacturers (OEMs) differ greatly in the level and type of telematics data they provide, impacting the effectiveness of equipment data as a reliable safety feed. Recognizing this inconsistency, we engaged directly with the Association of Equipment Manufacturers (AEM) and relevant International Organization for Standardization (ISO) committees to advocate for similar safety use cases to be included in their API development considerations.

Lastly, during early efforts to connect contractor equipment telematics into the portal, we discovered a frequent disconnect between OEM headquarters, their dealerships, and contractors. OEM dealers were not always aware of or aligned with agreements initiatives at the OEM headquarters level. To address this, we adjusted our strategy by convening joint meetings with the contractor, OEM dealership representatives, and OEM headquarters personnel early in the deployment process. This collaboration minimized confusion,reduced unnecessary costs to the Department, and streamlined the overall implementation effort.