



# e-Ticketing and the Future of Construction through the Connected Jobsite

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Senior Program Manager  
Industry Relations and Government Affairs

October 19, 2023





# About Speaker

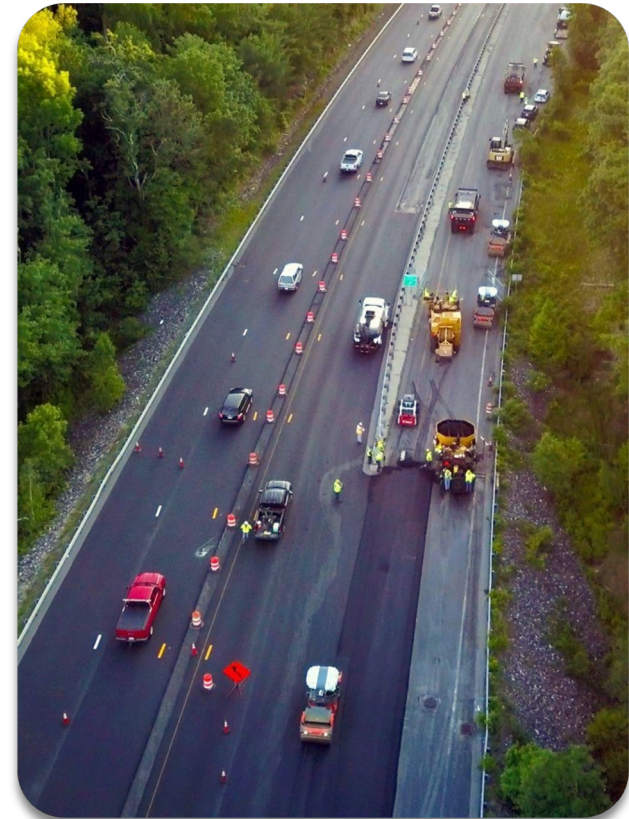


- Massachusetts Native - Reside in Haverhill
  - Struggling Patriots Fan (hey we won against the Bills!)
- Senior Program Manager of Industry Relations & Government Affairs
- Public Engagement Coordinator - The National e-Ticketing Task Force
- Recovering Political Staffer | Campaign Professional
  - Worked for Senators and Representatives in MA General Court
- Graduate of Westfield State University, Class of 2009
  - Bachelors of Science: Criminal Justice
  - Bachelors of Arts: Political Science

## Purpose of Today's Discussion

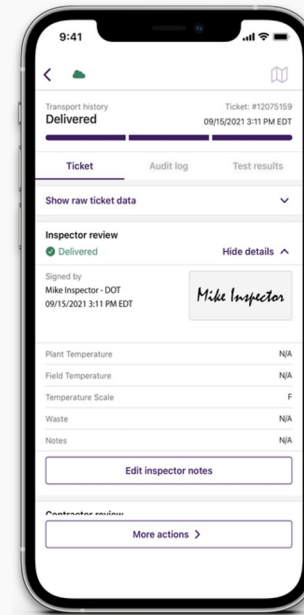
Gathering Construction Industry Influencers and Thought Leaders Together to Discuss:

- Recapping where we are at with nationwide e-Ticketing
  - What's going on in the Northeast?
- Why e-Ticketing Matters
  - How e-Ticketing is the gateway to e-Construction
- The Art of the Possible: What comes next after digitizing all the paper tickets?
  - Digital Delivery & Building Information Modeling
  - Continuous Intelligence
  - Safety and Traffic Communication



# What is e-Ticketing? (A Familiar Scene For Many)

It's streamlining the way the materials information is delivered to all parties involved in the supply chain.



From this

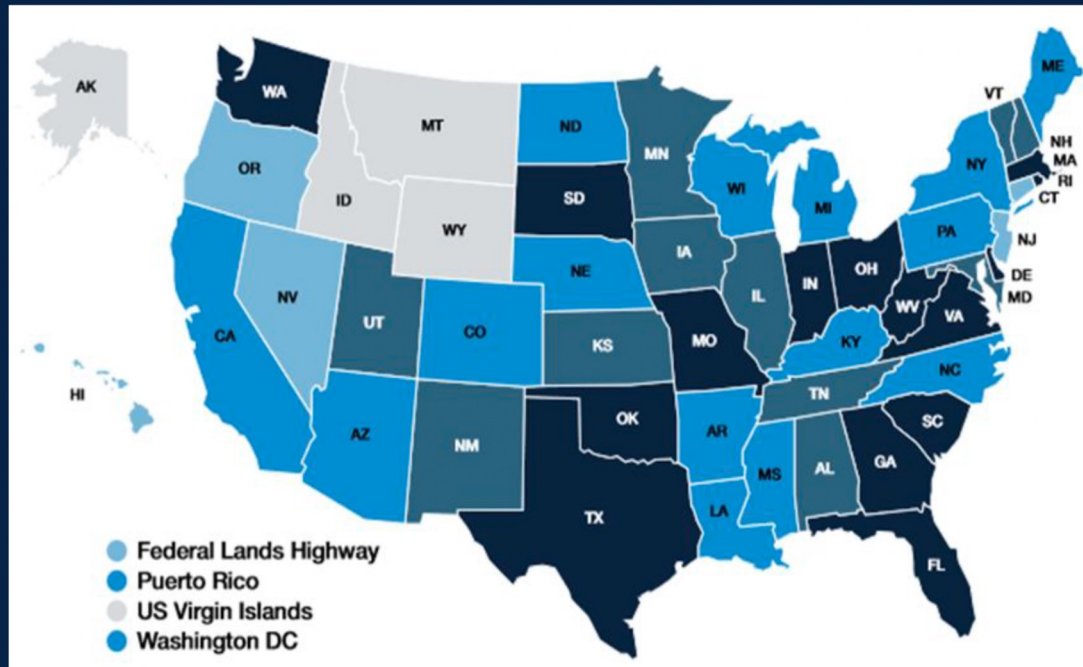


To this



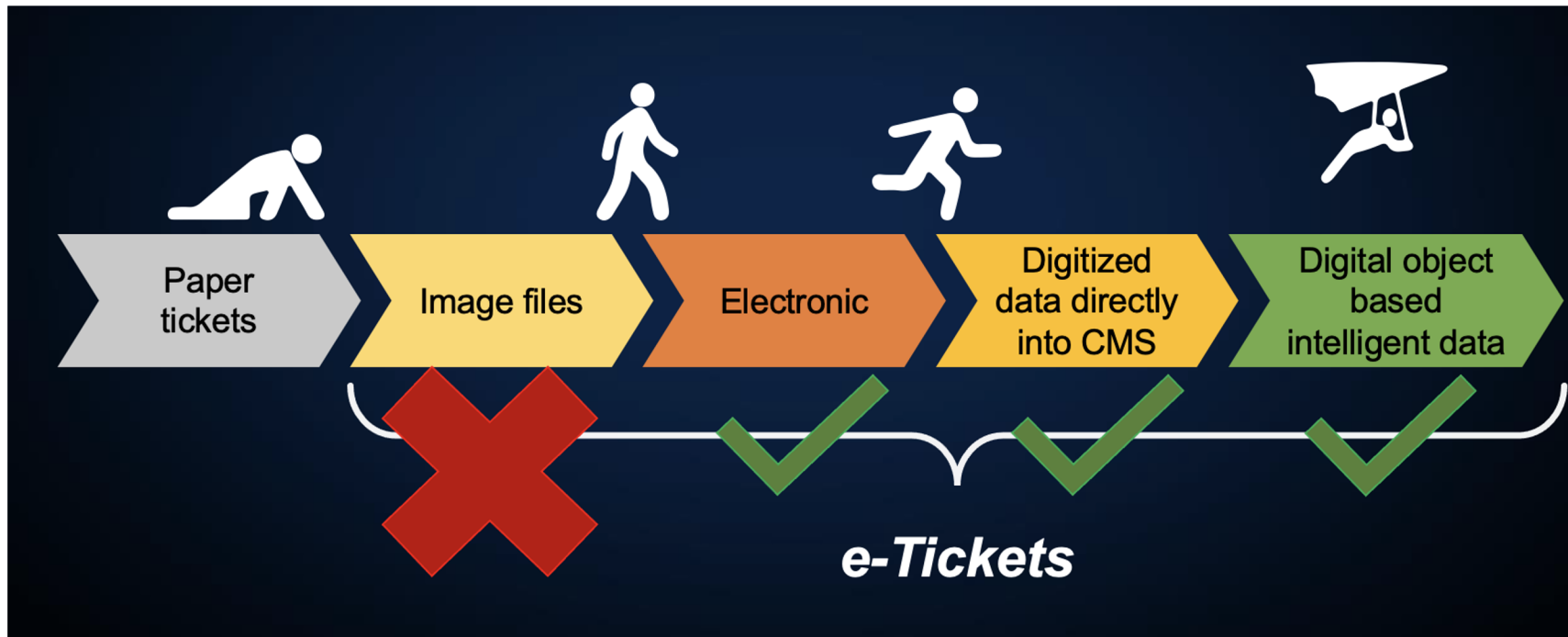
# Implementation Rapidly Accelerating

## Implementation - EDC-6 Final Report (December 2022)



Source: FHWA

## What an e-Ticket Isn't:





## Where Does The Push Come From?

- Every Day Counts (EDC) is a program run by the USDOT's Federal Highway Administration (FHWA) that promotes innovation in highway construction
  - Leaders from Industry, Government, and Academia Tackle Challenging Construction Problems and Collaborate to Deploy Innovative Solutions to Shorten Project Delivery Times, Improve Safety, and Automate Processes
- The focus of the latest round of innovations (EDC-6) are on e-Ticketing and Digital As-Built



### e-Ticketing Fundamentals

e-Tickets provide the link between what was designed and what was built

As States move towards full digital delivery of project documents, e-Tickets will be a requirement to work with DOTs

e-Tickets will need to tie into DOTs Materials Management Portals to feed their digital as-built models

### Digital As Built Fundamentals

States moving to digital delivery of plans

3D models increasingly becoming part of legal contract documents

Digital As-Built reflect what was actually built by aggregating field data and comparing to original design

Data used going forward to build projects more effectively





# Industry Wide Rally: Let's Keep it Simple to Make e-Ticketing Practical

Top 5 Asphalt Pavement Industry Issues

**NAPA** NATIONAL ASPHALT PAVEMENT ASSOCIATION

**FEATURED WEBINARS**

**WEBINAR**  
**Digitizing the Supply Chain: Practical Lessons Learned on e-Ticketing Implementation**  
 MARCH 10, 2022 @ 6:00PM

**NSSGA**  
 NATIONAL STONE, SAND & GRAVEL ASSOCIATION

**Announcing the IT Task Group**  
 The Digital Transformation and Process Improvement Task Group (IT Task Group), a newly formed group within the FPI Group dedicated to addressing emerging technology challenges within the industry, will meet for the first time at NRMCA's Annual Convention at 12:30PM on Tuesday, March 15. Keith Onchuck of Ozinga and Luis Angulo of CalPortland will co-chair the Group. To RSVP for the IT Task Group Meeting, click [here](#).

**Now named Business Advancement Committee Via Board Vote in 2022**

**NRMCA**  
 NATIONAL READY MIXED CONCRETE ASSOCIATION

*Digital Construction Policy Statement – May 2021*

*Digital Construction is defined as commercially proven digital technologies and processes for management of construction and engineering activities, including systems for infrastructure project procurement, planning and coordination, construction, digital as-builts, e-Ticketing, operations and maintenance, modernization and management, asset management systems for machines, site equipment, and personnel.*

**ARIBA** American Road & Transportation Builders Association



• Source NAPA Annual Business Meeting Presentation, Scottsdale, AZ 23 Jan 2022

# The 'Keep It Simple' Approach is Validated (August 2022) University Texas at Arlington

## E-Ticketing in Highway Construction: Reasons for Delayed Implementation

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Email: [karthikeyan.loganathan@uta.edu](mailto:karthikeyan.loganathan@uta.edu)

### ABSTRACT:

The evolution of technology and the use of mobile devices for performing daily operations has benefited the construction industry. E-Ticketing can automate most administrative processes in highway construction, provide valuable insights into daily operations, and increase inspector safety. Many state departments of transportation (DOTs) have conducted pilot testing of the technology and have opted not to install or acquire it for a variety of reasons, and a few have discontinued their pilot studies. Thus, the objective of this study is to identify and pinpoint the misconceptions surrounding the utilization and implementation of e-Ticketing and to explore ways to make it attractive to more users. To achieve this, an extensive literature review was conducted of studies that investigated the implementation of technology. Then, semi-structured interviews were held with 13 individuals who are employed in the highway construction industry. Inductive thematic analysis of the interview transcripts revealed two primary causes for the delays in implementing the technology: (1) a misunderstanding resulting from the partial implementation of the platform during Covid-19, and (2) a high initial investment cost for state DOTs because of overlapping fleet management functionalities. This research will help DOT decision-makers and engineers in re-define the functionalities of the e-Ticketing platform, adopt regulations and standards, minimize project costs, provide initial funding, performing pilot testing, and enhance inspector safety.

### INTRODUCTION

E-construction is defined by the Federal Highway Administration as "The creation, review, approval, distribution, and storage of highway construction documents in a paperless environment" (FHWA 2021). E-construction is comprised of a vast array of technology and techniques designed to enhance productivity and safety by reducing the need to handle and manage paper paperwork. Each year, state DOTs collect, distribute, store, and archive thousands of paper tickets issued for the delivery of asphalt and concrete, an obsolete practice that exposes construction inspectors to

Reply Reply All Forward ...

"A comprehensive literature review and stakeholder survey were conducted and revealed that all 20 DOTs reported workforce shortages.

A comparison was made between the required number of inspectors prior to and after the implementation of e-Ticketing, and it was found that projects requiring multiple inspectors could reduce their workforce by 25% by implementing e-Ticketing. The findings of this research will enable state DOTs to reduce the number of inspectors on-site, thereby circumventing the shortage of workers."



# Workforce Challenges Are Numerous



CONSTRUCTION

## Construction Workforce Shortage Tops Half a Million in 2023

Feb. 20, 2023

In 2022, there were more than 390,000 job openings per month, the highest level on record.

EHS Today Staff

Source: EHS Today

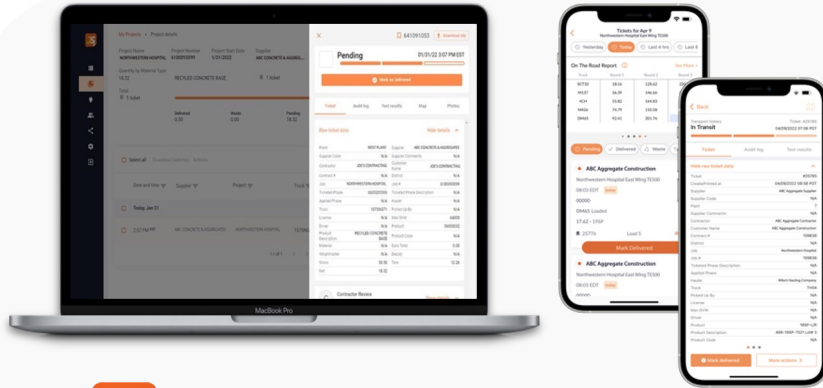
- Horizontal Construction has to do more with less.
- 41% of the industry is set to retire over the next decade (McKinsey Study)
- Young Millennials and Generation Z were born with technology in their hands.
  - Let's embrace it.
- Technology won't solve all our problems, but it can help.





# What Does e-Ticketing Look Like?

## For the Supplier: Smartphone Apps & Web Based Portals to Visualize Data



**JS** JOBslip

e-Ticketing tool **JOBslip** simplifies sharing critical construction materials data between project stakeholders. Making you the easiest construction partner to do business with.

Save countless hours searching for paper tickets on delivered loads. e-Ticketing eases the administrative burden for you and your customer.



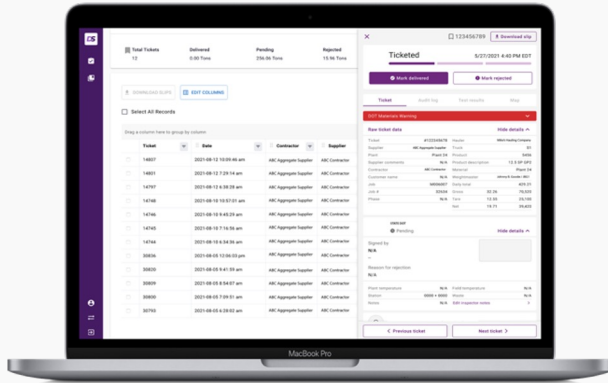
**SUPPLIER**ci

Empower your material ticketing data with easy-to-digest visualization tools to quickly analyze business trends, stay in-the-know on top performing customers or plants and intelligently forecast future performance.

The only data visualization tools that ties in to your point of sale for continuous business intelligence.

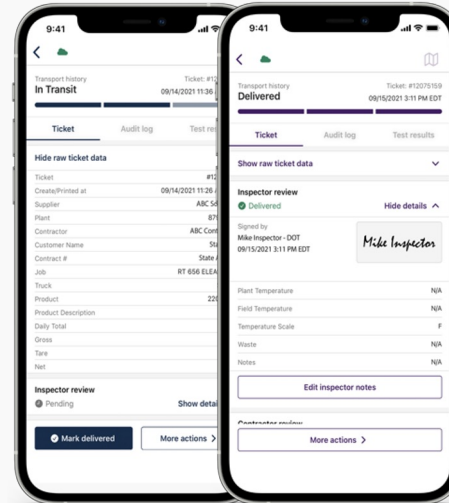


# For the Agency/Project Owner: It's The Same, But A Little Different

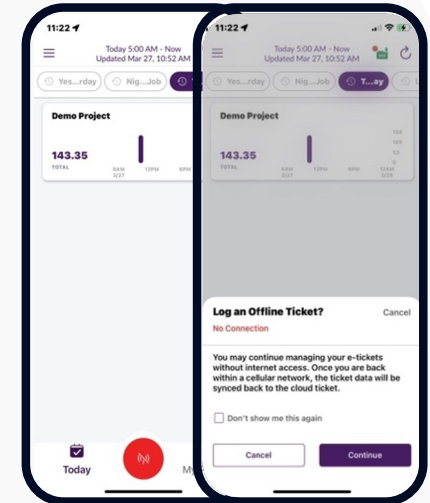


Web Based Agency Portal Access

The Agency Portal™ comes with access to DOTslip for your field inspectors, and JOBslip for your vendors, two simple mobile apps connecting the same data to one point of truth. It's all included as part of The Agency Portal™ experience at no additional cost.



Inspector View on Mobile App



Patented Offline Mode



# Deployment Of The Agency Portal:

## Option 1

### For Producers and Contractors with Internal IT Resources

Ohio/Indiana DOT will provide an API key for you to send ticket data to their respective DOT Portals



## Option 2

### For Producers and Contractors with existing e-Ticketing Solutions

Nothing changes, and your processes stay the same. The e-Ticketing provider will forward the tickets via API to the state DOT Portal



## Option 3

### For Producers with Limited to No IT Resources and no e-Ticketing Solution

Provide a simple solution to get your tickets flowing into the portal at no cost to you.



Example API: [tickets.transportation.idot.gov/userkey](https://tickets.transportation.idot.gov/userkey)



# Getting the Word Out: Communicate Value, Answer Questions, Train The Supply Chain



It's never been easier to get involved

## **E-TICKETING HAS ARRIVED IN RHODE ISLAND**

The Rhode Island Department of Transportation is moving towards digital ticketing with the goal of connecting all concrete, aggregate, and hot mix asphalt producers to the RIDOT e-Ticketing portal by the end of 2023.

[SIGN ME UP!](#)

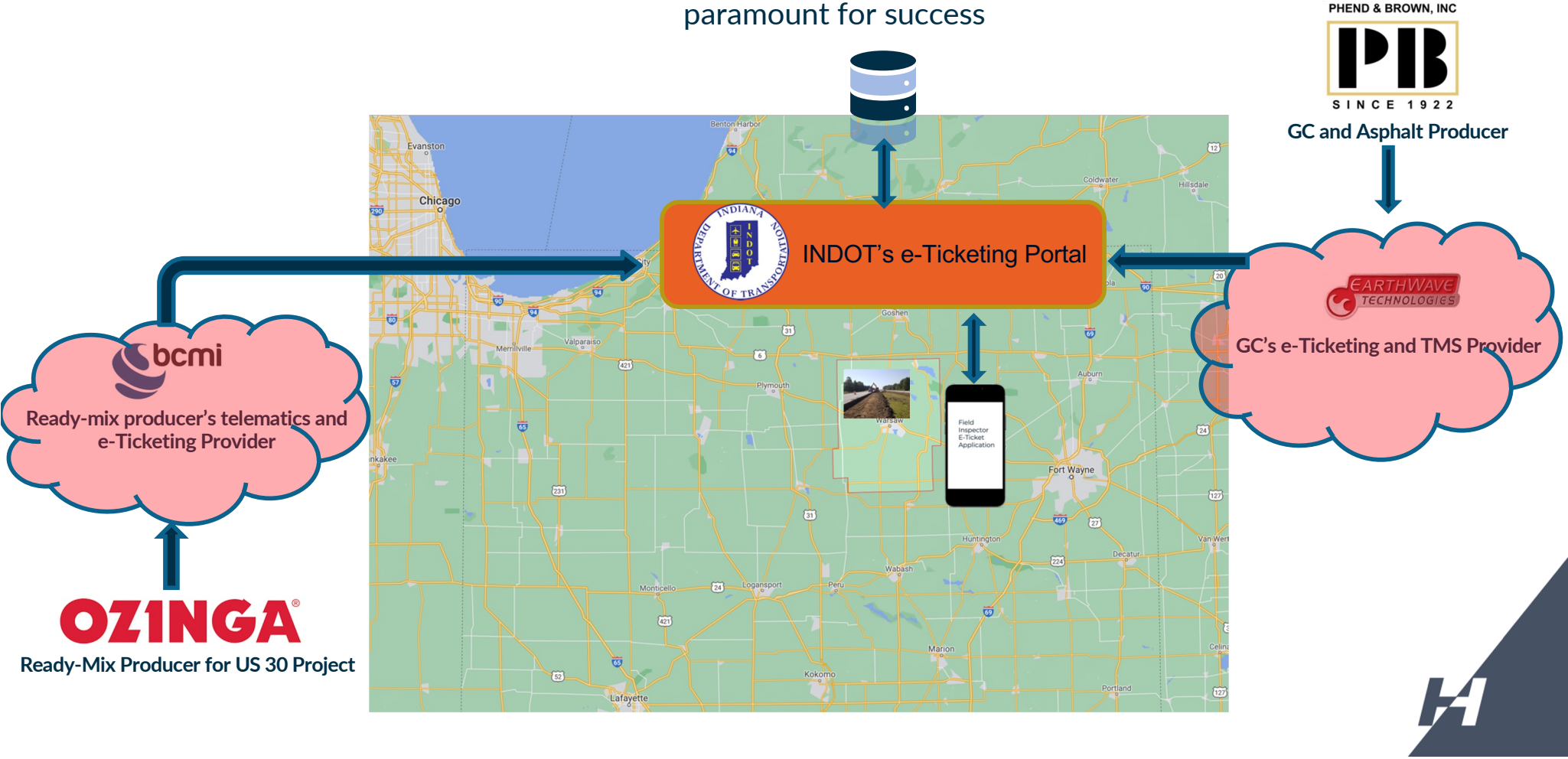
[Whats included? | How Does It Work?](#)





# A Collaborative Effort

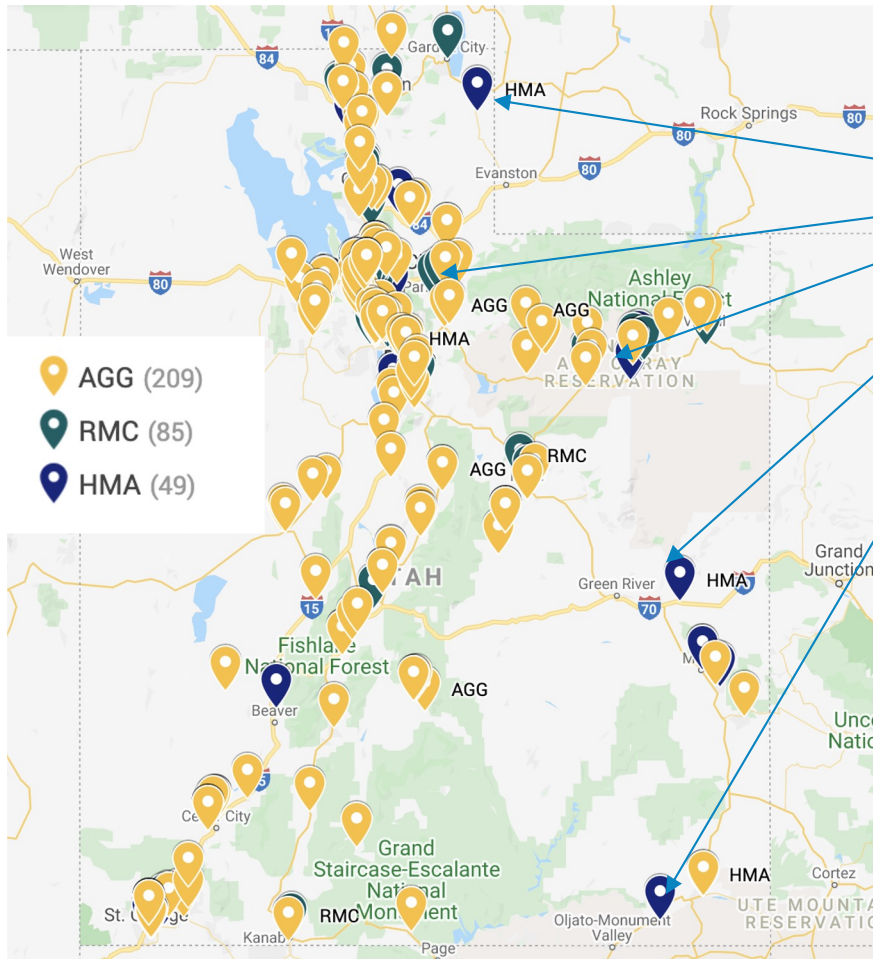
Collaboration between producers, contractors, public agencies and technology vendors is paramount for success







# Scale Across the Industry



Point of Sale



Relational Database (SQL)





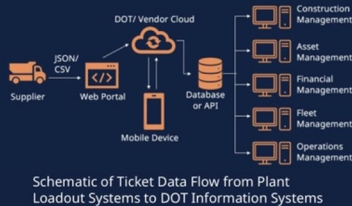
**e-Ticketing Opens the Data Gateway.**

**Where Are We Going?**

# Innovative Use Cases Emerging

## Using e-Ticketing Data

- ▶ Many use cases of ticket data
- ▶ 17 use cases identified to date and many more to emerge
  - Breaking down information silos
  - Connecting to other intelligent construction technologies
  - Expansion to new materials
- ▶ Need for a data strategy to connect data



## Uses of e-Ticketing Data

Creating daily work reports	Analyzing asset failure forensically
Automating payment processing	Creating better asset condition performance models
Automating price adjustments of liquid asphalt and other materials	Evaluating performance of mix designs and material sources
Auditing subcontractor payments / Disadvantaged Business Enterprise goals	Evaluating contractor performance based on asset performance
Creating an electronic proof of work	Calculating the usage of recycled materials statewide
Calculating paving flow rates	Providing law enforcement with geo-tracking
Linking placement and quantities data to optimize production and construction schedules	Auditing prevailing wages
Reporting construction progress	Supplementing quality assurance programs
Supporting Life Cycle Assessment with EPDs and Construction Data	



- **Automated Payments:** Streamlining across the supply
- **Inspection Revolution:** Automating and digitizing inspection processes for increased accuracy and reduced manual intervention.
- **Efficient Reporting:** Automated generation of work reports
- **Integrated Toolbox:** Seamless integration of digital materials with other advanced construction and management tools.
- **Holistic Project Oversight:** Enhanced real-time visibility and control





# Research into Digital Inspection

American Association of State Highway and Transportation Officials  
Special Committee on Research and Innovation

## FY2024 NCHRP PROBLEM STATEMENT TEMPLATE

### 1. PROBLEM TITLE

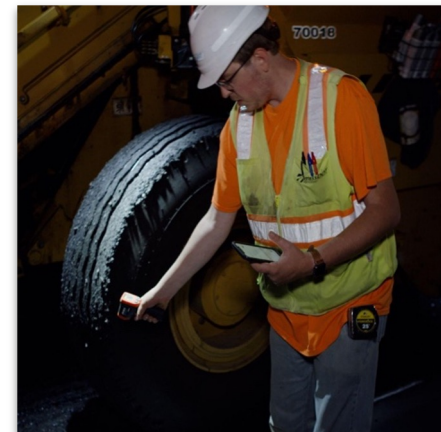
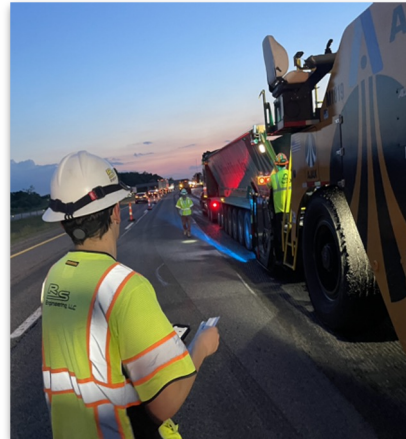
Guide for Successful Implementation and Integration of Digital Construction Inspection Technologies into DOT Workflows

### 2. BACKGROUND INFORMATION AND NEED FOR RESEARCH

In recent years, the landscape of transportation infrastructure has been rapidly evolving, presenting DOTs with a plethora of emerging methods and tools designed to enhance the efficiency and efficacy of field inspections. These advancements promise a revolution in the way inspections are conducted, potentially ushering in an era of streamlined, digitalized processes that can significantly augment the current capabilities of DOTs. However, this surge in available technologies has also brought forth a complex maze of choices, leaving DOTs grappling with decisions on which tools to integrate into their existing systems for optimal results. Moreover, the integration of digital tools into inspection activities is not just about the adoption of technology; it encompasses a broader spectrum that includes understanding the nuances of tool interoperability, training requisites, and setting achievable milestones. The transition to a digitalized inspection process is a multifaceted endeavor, requiring a holistic approach that considers various interconnected elements that contribute to a successful implementation.

To navigate this complex landscape, there is an urgent need for comprehensive research that can provide DOTs with a robust framework to facilitate the successful integration of digital tools into their inspection processes. This research aims to delve deep into the intricacies of digital tool integration, identifying the activities and methods of inspection that are most conducive to digital adaptation. By doing so, it seeks to foster a greater consensus across DOTs regarding the adoption of these technologies, thereby promoting a more unified approach to digital inspections.

Furthermore, the research intends to offer guidance on vital aspects such as training protocols to ensure that inspectors are well-equipped to leverage these tools effectively. It also aims to delineate clear milestones that can serve as markers of progress, helping DOTs to track the advancements made and adjust their strategies accordingly. A significant focus will be on understanding the interoperability of connected jobsite devices, equipment, and solutions, a critical component in creating a seamless and efficient digital inspection ecosystem.



# The Next Stage Will Have Additional Federal Support

## Advanced Digital Construction Management Systems Round One Submitters\*

Leveraging Federal Funding to Invest in Innovation



#### 4. PROGRAM GOALS

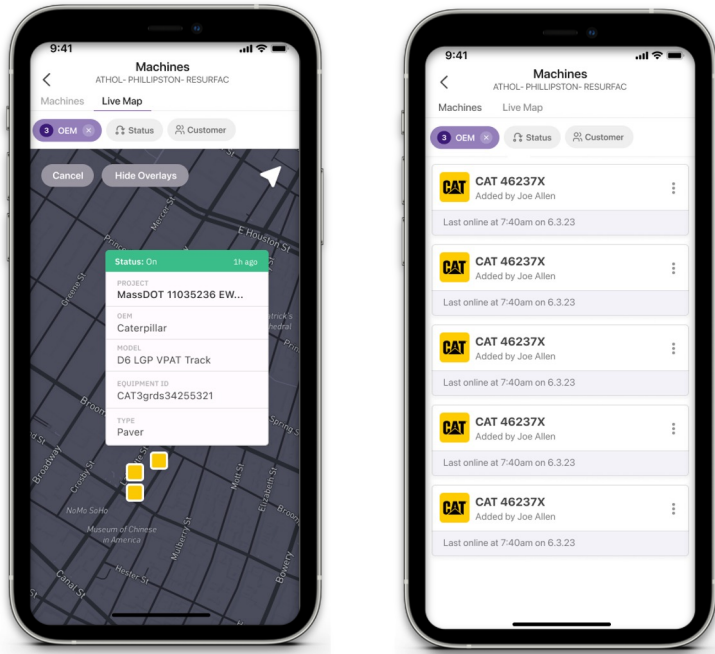
The goals of the ADCMS Program, as defined in 23 U.S.C. 503(c)(5)(B), include:

- Accelerated State adoption of ADCMS applied throughout the construction lifecycle (including through the design and engineering, construction, and operations phases) that maximize interoperability with other systems, products, tools or applications; boost productivity; manage complexity; reduce project delays and cost overruns; and enhance safety and quality;

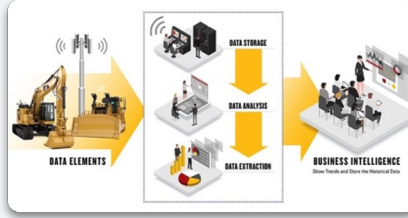


- **Leadership:**  
DeIDOT at the forefront with a collaborative approach, partnering with multiple state DOTs and industry stakeholders.
- **Enhanced work zone** and worker safety through connected construction resources.
- **National Impact:**  
Broad alliances with state DOTs, academia, and tech entities to set a new standard for U.S. work zones.

# Connecting Jobsite Equipment

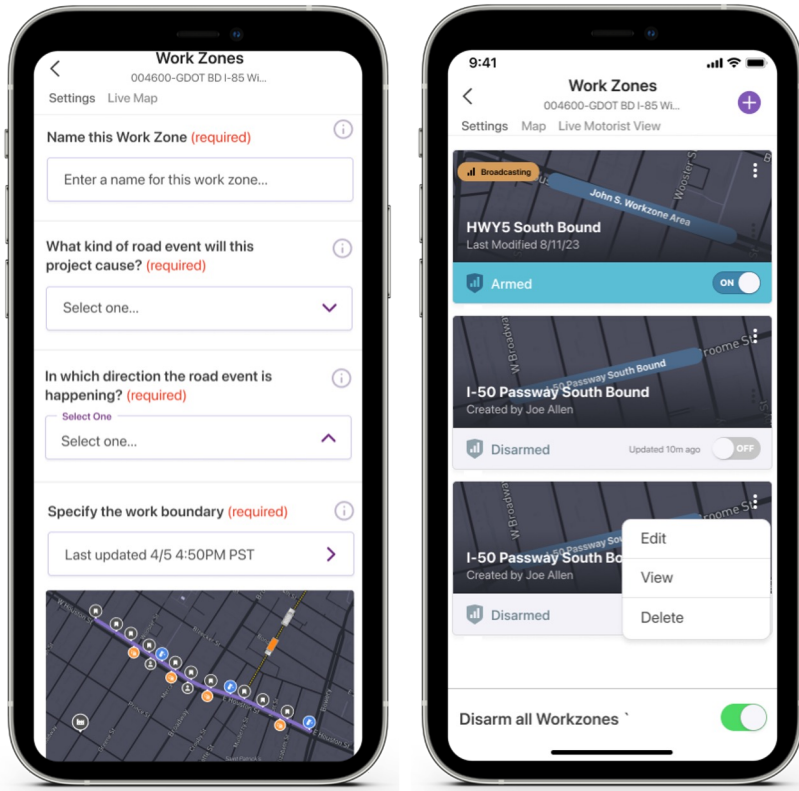


- **Standardized Telematics Data:**  
AEMP 2.0 introduces a universal standard for how equipment telematics data is collected and reported, ensuring compatibility and consistency across various manufacturers and systems.
- **Enhanced Integration and Interoperability:**  
With the adaptation of ISO standards in AEMP 2.0, there's a seamless integration with enterprise systems, allowing for more efficient data sharing and streamlined fleet management processes.





# Enhancing Work Zone Safety

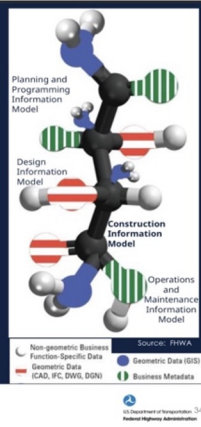


- **Who:** HaulHub along with the following DOTs applied for an ADCMS Grant:
  - ◆ Delaware, Iowa, Louisiana, Nebraska
- **What:** Fundamentally reimagining how job sites communicate with the traveling public to increase safety and awareness construction is underway.
- **How:** Connecting all devices and active machines on the job site to inform the work zone data exchange construction activity is taking place.
  - ◆ Pavers
  - ◆ Rollers
  - ◆ Drones, etc.

# Ties to BIM and the Environment

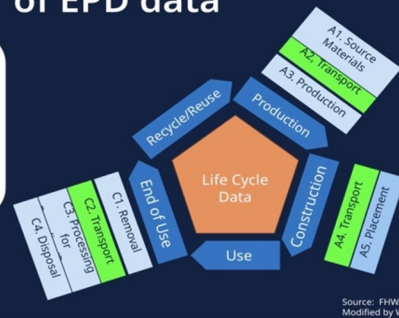
## The BIM for Infrastructure Link!

- ▶ BIM's blueprint for e-Ticket data to feed into a common data environment
- ▶ FHWA's BIM National Strategic Roadmap offers a path forward
  - Positive return on investments
  - DOT initiatives for data warehouses
  - Significant investments by both public and private sectors
  - Coordinated national and international efforts



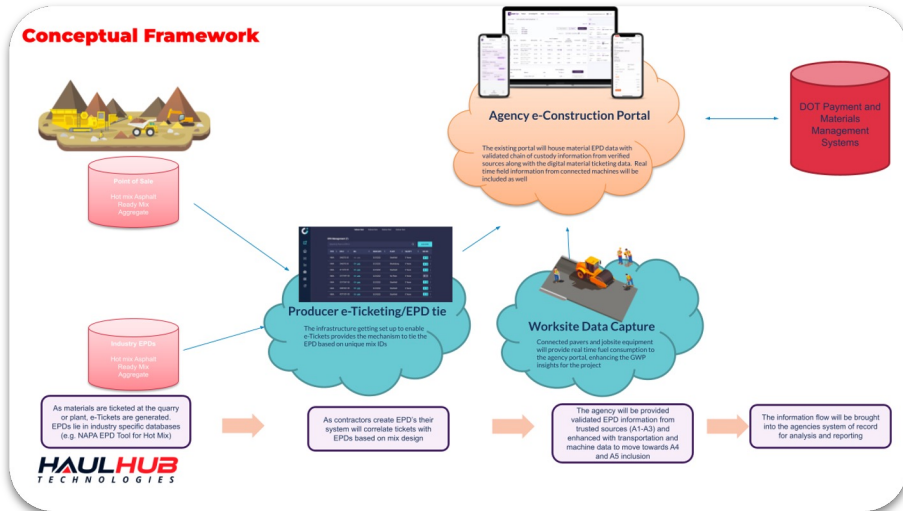
## e-Tickets as carrier of EPD data

- Using e-Ticketing infrastructure for EPD data transmittal
- Using e-Ticketing data (e.g., vehicle and trip data) to perform life cycle assessment

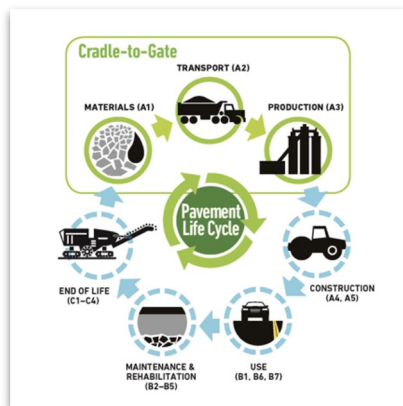


- **BIM & e-Ticketing Synergy:**  
BIM utilizes e-Ticket data, establishing a comprehensive data environment for infrastructure.
- **FHWA's Vision:**  
The BIM National Strategic Roadmap offers a progressive path, emphasizing ROI, public-private partnerships, and global collaboration.
- **Life Cycle Assessment:**  
e-Ticketing data aids in evaluating the environmental footprint across an infrastructure project's lifecycle.

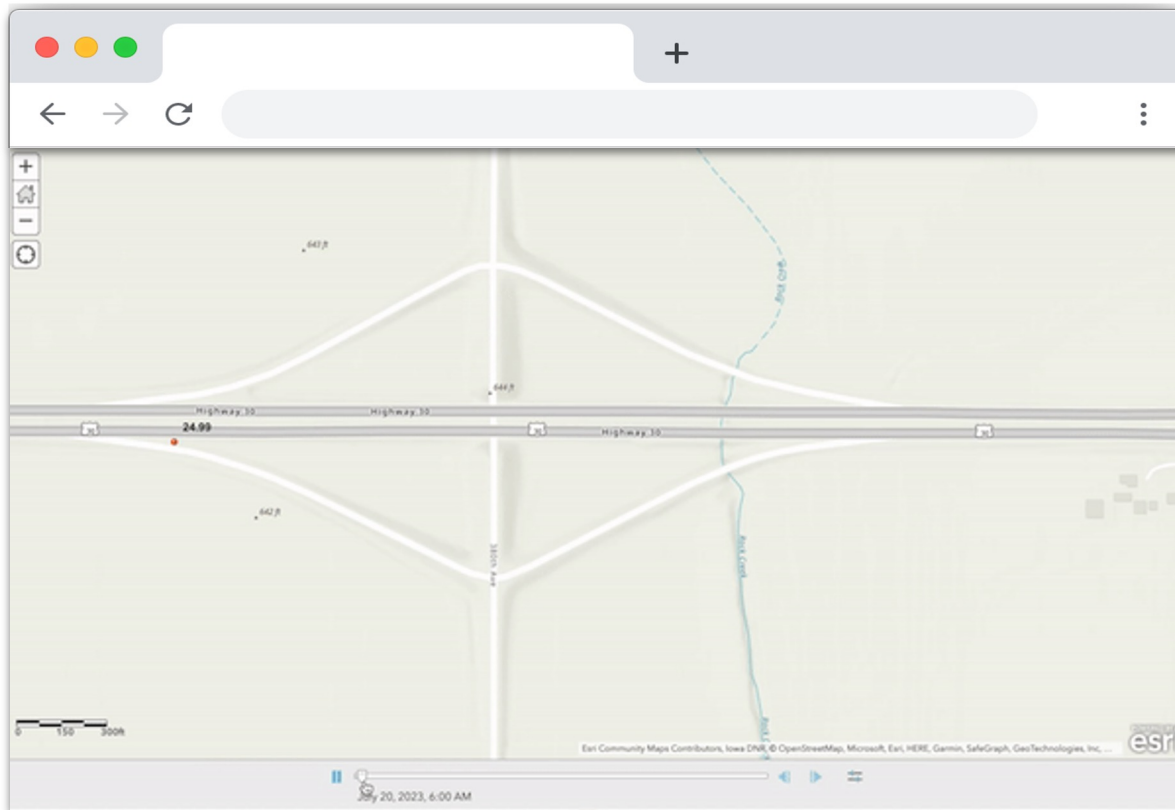
# Enabling Environmental Insights



- **Agency e-Construction Portal:** Integrates real-time data, including material EPD data and data from connected machines, offering a holistic view of construction activities.
- **Worksite Data Capture:** Utilizes connected pavers and jobsite equipment to provide real-time consumption of the agency portal, enhancing insights for projects.
- **Broad Engagement:** Collaboration with states like Colorado, California, Delaware, and Louisiana ensures a wide-scale, impactful implementation. NAPA, WAP Sustainability



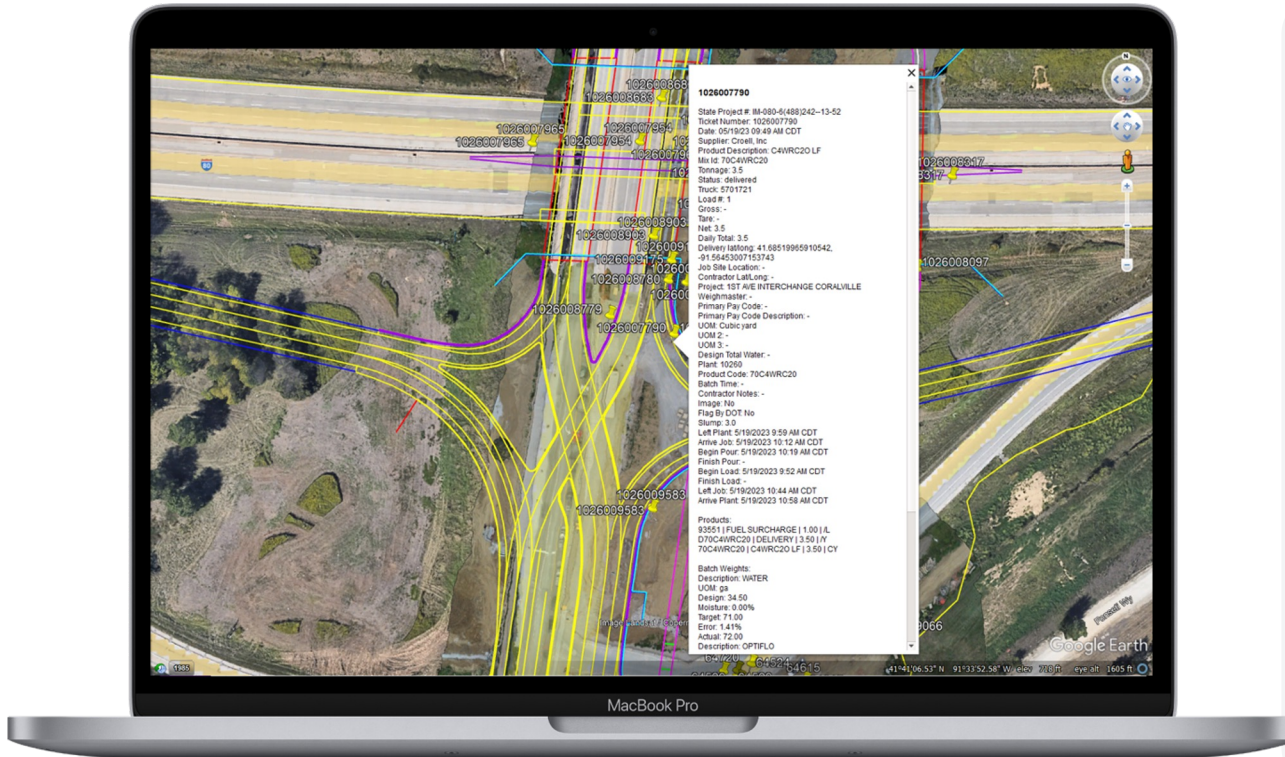
# Enhanced Insights into Job Performance



- **Unlocking** Materials Data Provides insights into real-time pavement data never before possible.
- **Real-time** pavement temperature monitoring and flow of work insights provide engineers across the state with valuable insights in the work going on in the field no matter where they are



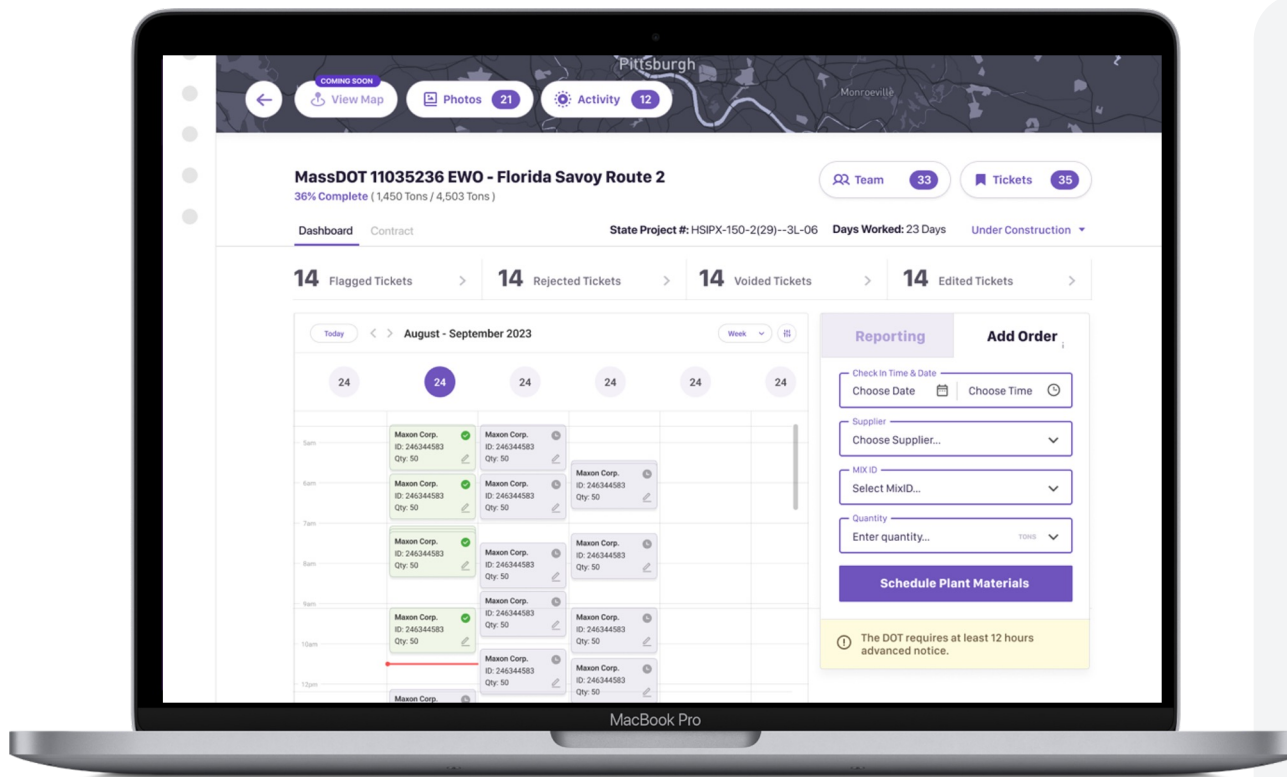
# Digital As-Builts and Ties to Models



- **Enhanced Decision-Making:** Real-time data from digital materials in BIM provides stakeholders with actionable insights, enabling more informed decisions related to cost, sustainability, and performance throughout the project lifecycle.
- **Streamlined Workflows:** The synergy between digital materials and BIM fosters efficient workflows, reducing the potential for errors, minimizing rework, and ensuring that projects stay on schedule and within budget.



# Efficiently Communicating Across the Supply Chain



- **Streamlined Coordination:** Facilitate smoother collaboration between suppliers, general contractors, DOTs, and subcontractors, leading to faster decision-making and efficient operations.
- **Proactive Planning:** Utilize the scheduling feature to anticipate material needs, ensuring resources are allocated efficiently and reducing project delays.
- **Enhanced Accountability:** Track material discrepancies with flagged, rejected, and edited ticket features, ensuring that all stakeholders maintain quality and delivery standards.





# DOTs Looking to Extend the Functionality

**MassDOT**

Submittals

12 Submittals

- Certificate Name
- Certificate Of Compliance
- Certificate Of Compliance
- Certificate Of Compliance
- Certificate Of Delivery
- Certificate Of Delivery
- Certificate Of Analysis
- Certificate Of Compliance
- Certificate Of Delivery
- Certificate Of Compliance
- Certificate Of Compliance
- Certificate Of Analysis
- Certificate Of Analysis

**Add Submittal**

Select Year: 2023      Select Project: Route 128 Resurfacing

Select Material: Erosion Control Systems      Select Certificate Type: Certificate of Delivery

Vendor/Supplier: Enter Vendor/Supplier...      Sample ID: Enter sample ID...

Dated: Erosion Control Systems      Approved Quantity (if applicable): Enter approved quantity...

Quantity Shipped: Enter quantity...      UOM: Enter UOM...

Upload Documents

- document10535.pdf (354KB) Remove
- document10535.pdf (354KB) Remove
- document10535.pdf (354KB) Remove
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Cancel      Submit

Status	
Approved	●
Approved	●
Approved	●
Rejected	●
Pending	●
Pending	●
Pending	●
Pending	●
Pending	●
Pending	●
Pending	●
Pending	●

**Material Certificates**

Materials      Certificate Types

21 Materials

**Add New Material**

Material	Certificate Type(s)	Date Added	T1	Added By	T1
Electrical Conduit	Item Description...				
↑ Search for a material	↑ Select which certificates apply				
Adhesives For Raised Pavement...	Certificate Of Analysis	2021-11-10 5:45PM EST		John Smith	
Raised Pavement Marker	Certificate Of Compliance, Certificate Of Analysis	2021-11-10 5:45PM EST		John Smith	
Traffic Paint And Glass Beads...	Certificate Of Analysis	2021-11-10 5:45PM EST		John Smith	
Performed Plastic Pavement M...	Certificate Of Delivery, Certificate Of Analysis	2021-11-10 5:45PM EST		John Smith	
Thermoplastic Compound (H...	Certificate Of Compliance	2021-11-10 5:45PM EST		John Smith	
Joint Sealant	Certificate Of Compliance, Certificate Of Delivery	2021-11-10 5:45PM EST		John Smith	
Asphalt Anti-Stripe And Concr...	Certificate Of Delivery	2021-11-10 5:45PM EST		John Smith	
Erosion Control Systems...	Certificate Of Delivery	2021-11-10 5:45PM EST		John Smith	
Geotextile Fabric...	Certificate Of Delivery	2021-11-10 5:45PM EST		John Smith	
Automotive Fluids, Lubricant...	Certificate Of Compliance, Certificate Of Delivery, Certificate Of Analysis	2021-11-10 5:45PM EST		John Smith	

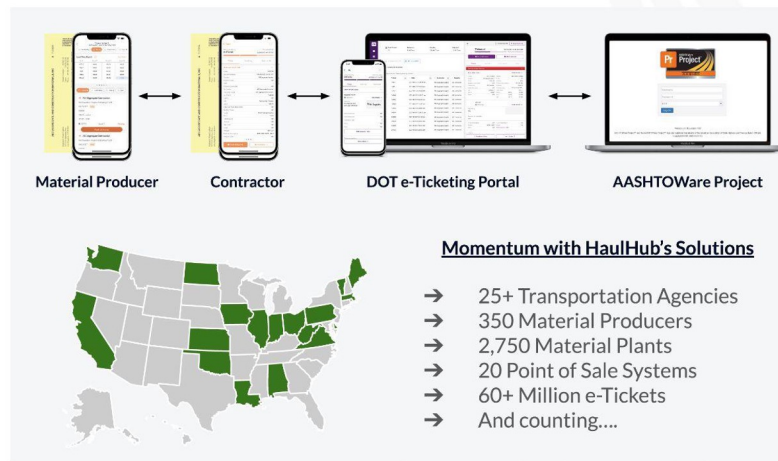
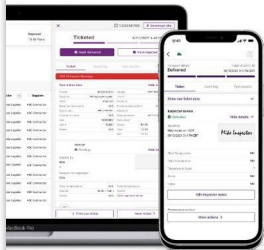


# DOT e-Ticketing - AASHTOWARE Project

## DOT e-Ticketing™

Transportation Agencies across the nation leverage HaulHub's DOT e-Ticketing™ solution, industry expertise, and dedicated support, to ensure seamless e-Ticketing implementation while maximizing operational efficiency.

- 2-way communication with GC/Producer
- System of record for material payments
- Daily Work Report Automation
- Simple connection with any loadout system
- Works with all construction material types



**DOT**  
eTicketing by **HAULHUB**  
TECHNOLOGIES

**AASHTOWare™**  
**PROJECT**

- 2-way communication with GC/Producer
- Automated Daily Work Reports
- Integrates easily with all loadout systems and all construction material types.

# Wrapping Up



- Embracing Digital Transformation
- Real-time Benefits with Digital Materials
- A Connected Construction Future
- BIM: The Confluence of Data
- Championing a Unified Approach



# Questions?



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