

# ***E-Construction & Electronic Load Ticketing***



# What is e-Construction?

e-Construction makes transportation projects “paperless”

- Design (Virtual design)
- Bidding
- Construction
- Requests for information
- Billing
- Project management
- Acceptance and testing



# Recognized by National Agencies



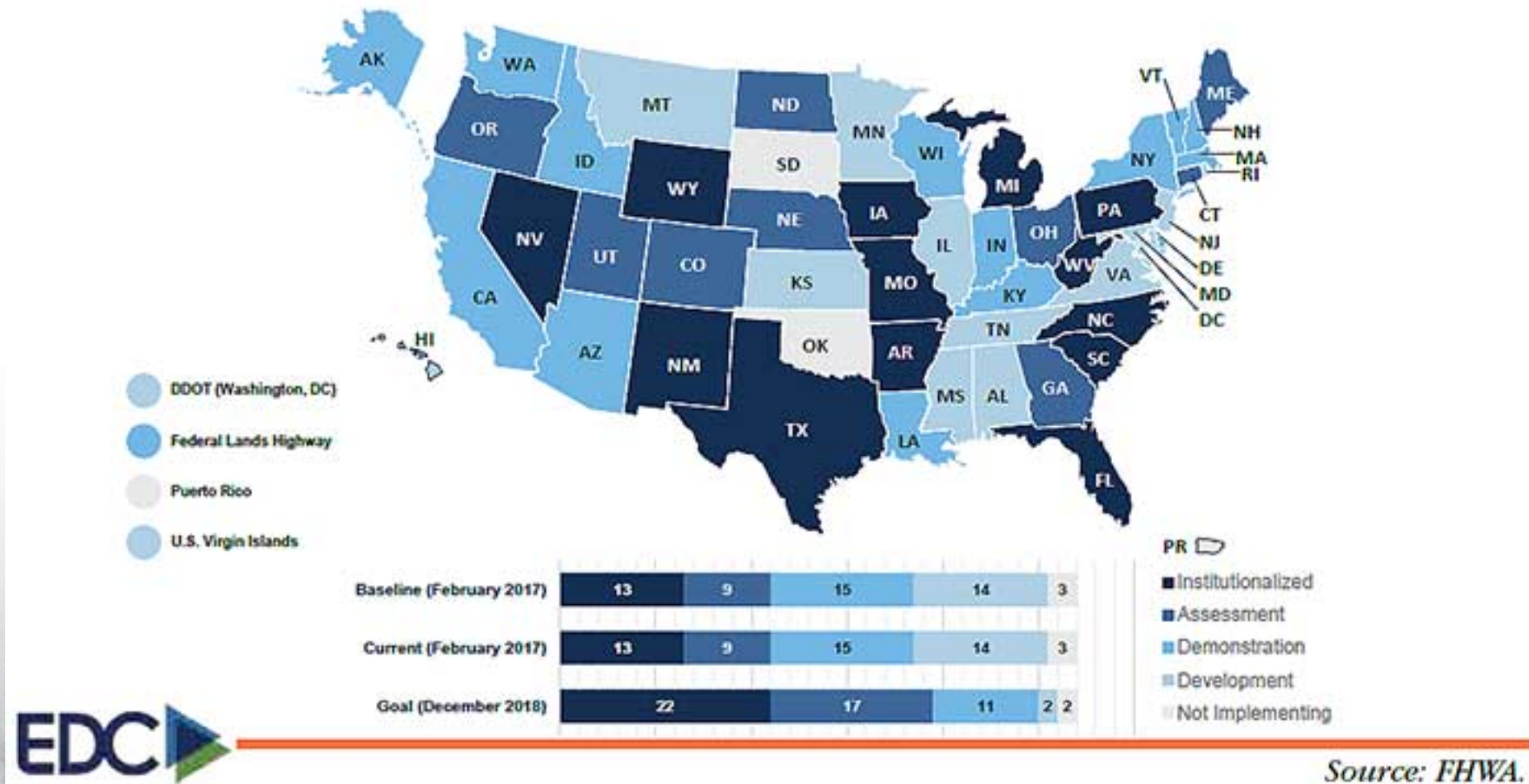
- EDC-3 and EDC-4 (“Every Day Counts”)
- “e-Construction” since 2015
- Paperless Projects



- AII – AASHTO Innovation Initiatives
- Integrated Technology Committee
- AASHTOWare

# State DOTs and e-Construction

## e-Construction Implementation as of February 2017





# Where do electronic tickets fit in?

Paper tickets are one of the last remaining items to be handled with an antiquated paper process.

The printed ticket carried by the driver may or may not be signed by the party receiving the load.

What is important is the information displayed on the printed ticket, not the paper itself.

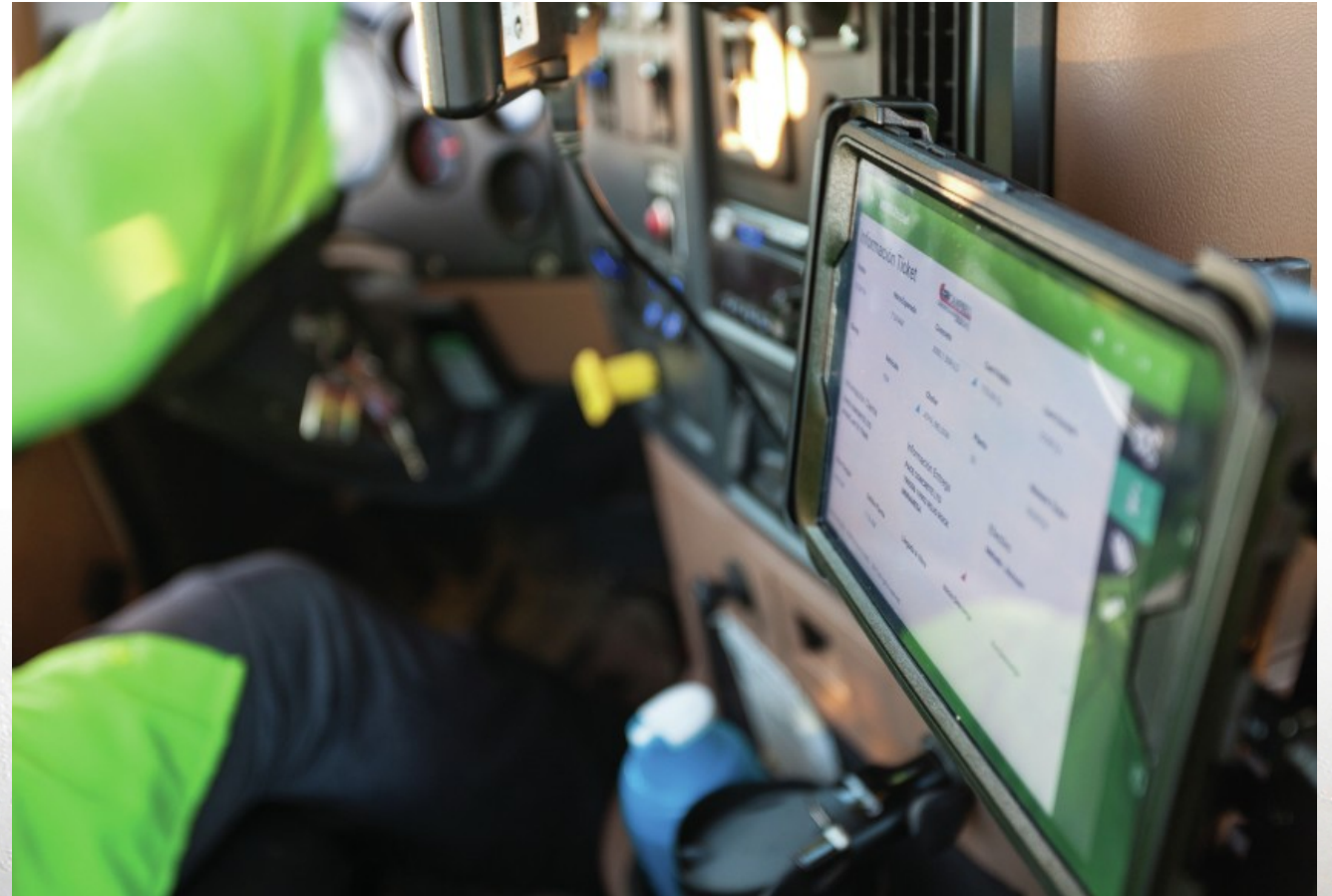
# How does e-ticketing work?





# Electronic delivery tickets

- Paper ticket is replaced by an electronic version on a tablet or smart phone
- Sent directly to the driver in the cab
- PDF file of the signed ticket is generated and sent via email to producers back office & the customer
- Allows for web-based download
- Quickly identify exceptions



# Electronic aggregate ticket example

<div style="font-size: 2em; font-weight: bold; margin-bottom: 5px;">MCM</div> <div style="font-weight: bold;">Midwest Concrete Materials, Inc.</div>	<div>PO Box 668, Manhattan, KS 66505-0668, (785) 776-8811</div> <div style="font-size: 0.8em;"> <b>Notice:</b> The carrier/customer involved in the transportation or handling of materials covered by this document may be an independent entity and shall not be deemed for any purpose to be an employee, agent or representative of <b>Midwest Concrete Materials, Inc.</b>. The carrier/customer shall save and hold <b>Midwest Concrete Materials, Inc.</b> harmless from all liability, damages, losses, claims, demands and/or actions of any nature which arise out of or are related to, or are claimed to arise out of or be related to such transportation or handling of such materials.         </div>	<div style="font-size: 1.2em; font-weight: bold;">Ticket 10068826</div> <div style="font-weight: bold;">Reference</div>
		<div>3/22/2017      3:32 PM</div> <div>Location:      10 KAW Sand Plant</div>

<b>Carrier</b>	MCM	Midwest Concrete Materials			
<b>Vehicle</b>	DT0088				
<b>Driver</b>	ARIC CHAMBERS				
<b>Customer</b>	JO1092	JONES CONSTRUCTION, LLC			
<b>Order</b>	18540	-			
<b>Product</b>	A4540	2" CRUSHED CONCRETE			
<b>P.O.</b>	FLINT HILLS LANDING				
<b>Deliver</b>	HWY 24 & FLUSH RD				
-					
HWY 24 & FLUSH RD					
<b>Weighmaster</b>					
<b>Received</b>					

	<b>Qty</b>	<b>Rate</b>	<b>Amount</b>
<b>A4540</b>	17.73 Ton	-	-
<b>Freight</b>	10 Miles		-
<b>Tax</b>	48		-
<b>Total</b>			-

	<b>Weight</b>
<b>Gross</b>	31.27 STN
<b>Tare</b>	13.54 STN
<b>Net</b>	17.73 STN
	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <b>Today</b>  <hr style="width: 80%; margin: 0 auto;"/> </div> <div style="text-align: center;"> <b>Order</b>  <hr style="width: 80%; margin: 0 auto;"/> </div> </div>
<b>Loads</b>	
<b>Qty</b>	<div style="display: flex; justify-content: space-around;"> <div>0</div> <div>400</div> </div>

<b>Customer Signature</b>
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# Benefits of electronic tickets

- **Speed delivery of tickets:** Original image is available to ALL parties immediately after signoff of the ticket or sooner.
- **Reduce or eliminate handling costs of paper tickets:** Paper copies are subject to damage and increase courier time or services. Electronic tickets reduce and/or eliminate that complexity.
- **Facilitates archiving, search and retrieval:** Electronic storage is less expensive and more reliable than physical storage.
- **Eliminate printers, scanning/scanners:** Scanning tickets at projects can be inaccurate, time consuming, and requires expensive hardware (more IT costs to manage).

# What Producers are saying:

- Midwest Concrete Materials Rolled electronic ticketing out to their aggregate side of the business and the results were almost immediate:
  - Radio traffic decreased
  - Driver time in yard decreased (approximate average of 10 minutes per driver/per load)
  - Eliminates duplicate entry of data, ticket images are imported directly into their financial software
  - MCM's internal staff was able to invoice quicker

-Mike Sanson



# Leading the Way: Michigan

- MDOT started using e-Construction on several pilot projects in 2012 and implemented full statewide paperless construction for all trunkline contracts starting with its October 2014 letting. Today, MDOT's trunkline construction operations are 99 percent paperless.
- MDOT estimates cost savings of \$12 million annually and savings of 6 million pieces of paper per year from e-Construction. It also estimates an average reduction in the processing time for complex change orders from 30 days to 3 days. The agency is seeing inspectors spend less time on paperwork, as well as increased employee and stakeholder engagement.

-FHWA

# Leading the Way: Michigan

- MDOT is currently “monitoring” e-ticketing
- Following FHWA initiatives, but not aggressively
- Moving soon to AASHTOWare on construction & materials
- Develop permissive spec in 2019
- Begin piloting e-ticketing on projects in 2020

-Matt Belgowan  
Construction Operations Engineer  
MDOT



# Things to consider

- What information is required (ticket + add-ons)?
- How does DOT want to receive it (PDF, data, frequency)?
- How will the data be recorded?
- What are state laws for providing a BOL?
- What will be done with the data later (leveraging data)?
- How will the data be secured?
- What are fall-back options?
- What will the future bring?

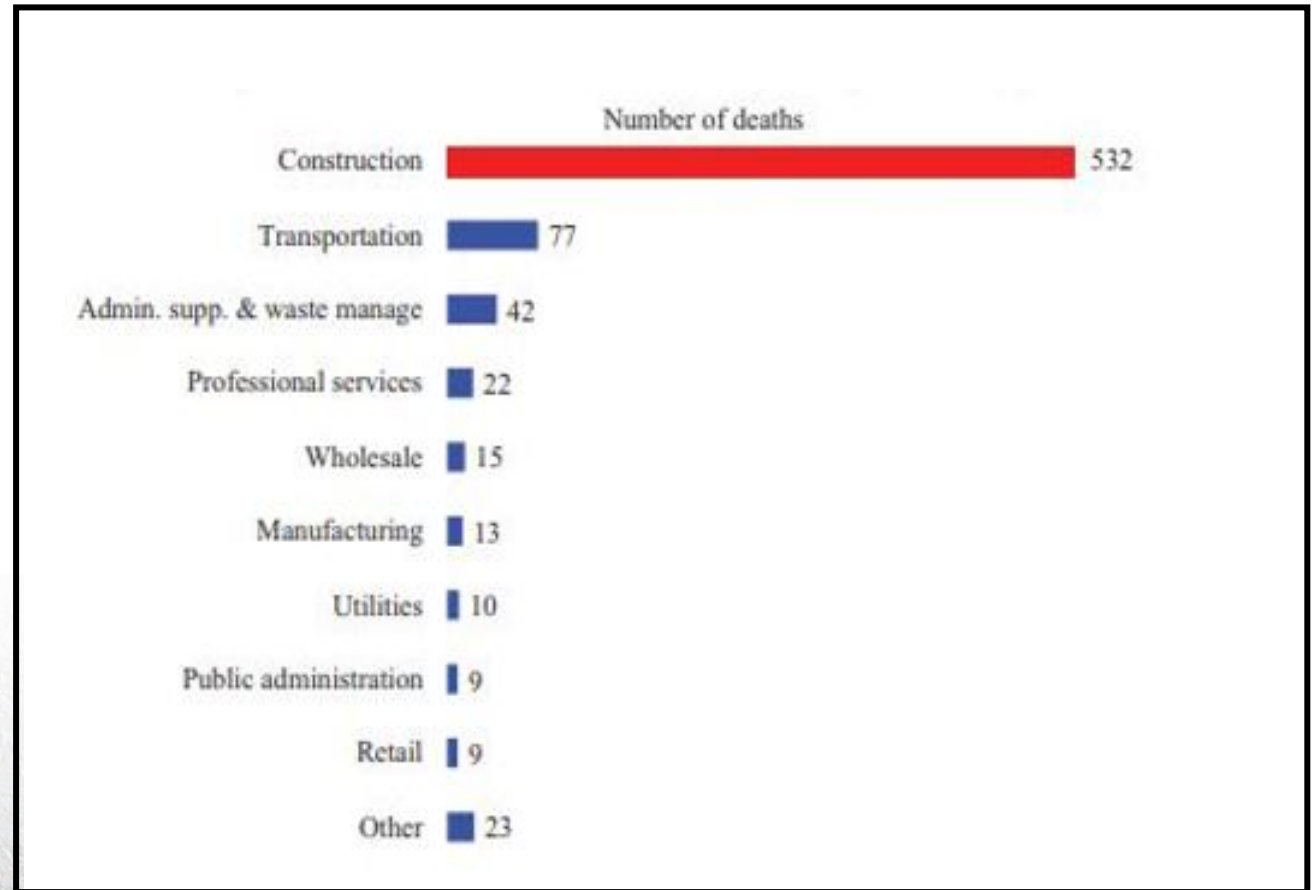
What is the number one driver for adopting e-tickets with DOT representatives I have spoken to?



**SAFETY**



- 532 construction workers were killed at road construction sites from 2011-2016. This is more than twice the combined total for all other industries combined.
- About half of those fatalities resulted from workers being struck by vehicles or mobile equipment.
- The number of construction worker deaths rose by 43% to 103 in 2016 from a period low of 72 in 2013.





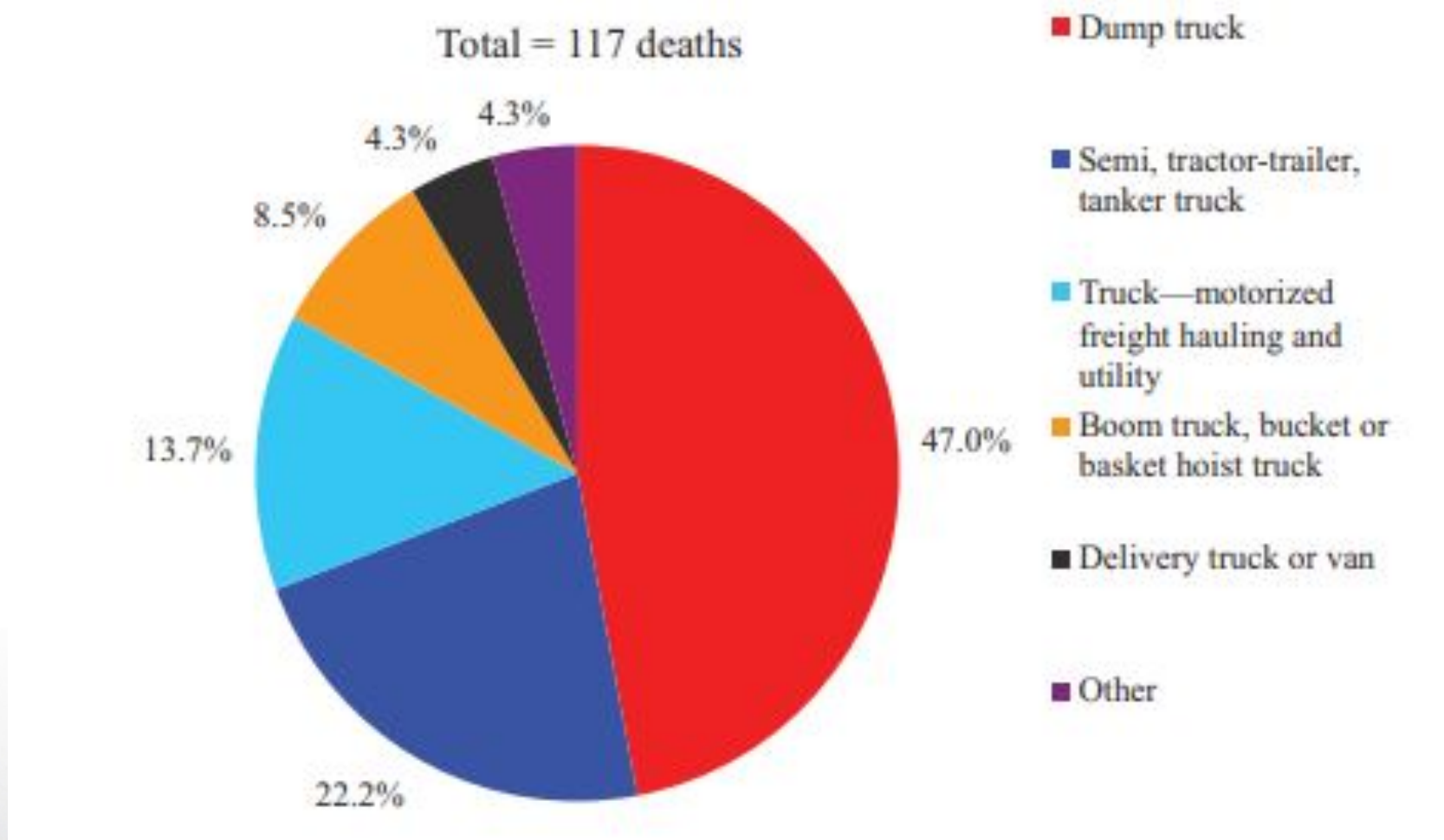


**Fatality Causes:** The primary causes of worker fatalities in recent years were:

- Runovers/backovers: 48%
- Collision Between Vehicles/Mobile Equipment: 14%
- Caught Between/Struck by Construction Equipment and Objects: 14%

– CPWR Data Report





Fatalities at road construction sites caused by trucks, by primary source, sum of 2011-2016

– CPWR Data Report



# Why the push for e-ticketing now?





# Technology is Already in Place

- Smartphones are everywhere
- Tablet use in trucks is common
- ELD requirements
- GPS
- Time tracking/Payroll
- Fleet Maintenance
- Forward-looking camera systems
- Driver Scorecards

# Maturing Data Can Be Leveraged

- LTPP – Long Term Pavement Performance (1991)
- AASHTOWare Site Manager (1997?)
- MEPDG - Mechanistic-Empirical Pavement Design Guide
- Performance Engineered Mixtures
- MAP-21 - The Moving Ahead for Progress in the 21st Century
- E-Construction
- Focus on capturing data electronically and moving toward performance



# Why should I care?

- DOTs
  - What are our current requirements (content and delivery)?
  - What do we want to accomplish (both today and tomorrow)?
- Producers
  - Do we have the programs available to meet project requirements?
  - What are the cost implications for software, equipment & training?
  - How do we manage 3<sup>rd</sup> party haulers?
- Contractors
  - How do we meet DOT requirements?
  - How can we leverage the data that is available?



# The Future?



Photo Courtesy Pit & Quarry

- Technology will go far beyond e-tickets
- Drones laser scan right-of-way
- GPR technology evaluates sub-grade
- Predictive software designs new road, selecting sub-grade, pavement and material requirements
- Optimized scheduling and supply chain
- Paving train prepares sub-grade and performs 3D printing of road



# Questions?

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