

NATIONAL
ACADEMIES

Sciences
Engineering
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TRB TRANSPORTATION RESEARCH BOARD

TRB Webinar: Electronic Ticketing—Current Practices for Concrete Pavements

January 31, 2023

1:30 – 3:00 PM



PDH Certification Information

1.5 Professional Development Hours (PDH) – see follow-up email

You must attend the entire webinar.

Questions? Contact Andie Pitchford at TRBwebinar@nas.edu

The Transportation Research Board has met the standards and requirements of the Registered Continuing Education Providers Program. Credit earned on completion of this program will be reported to RCEP. A certificate of completion will be issued to participants that have registered and attended the entire session. As such, it does not include content that may be deemed or construed to be an approval or endorsement by RCEP.



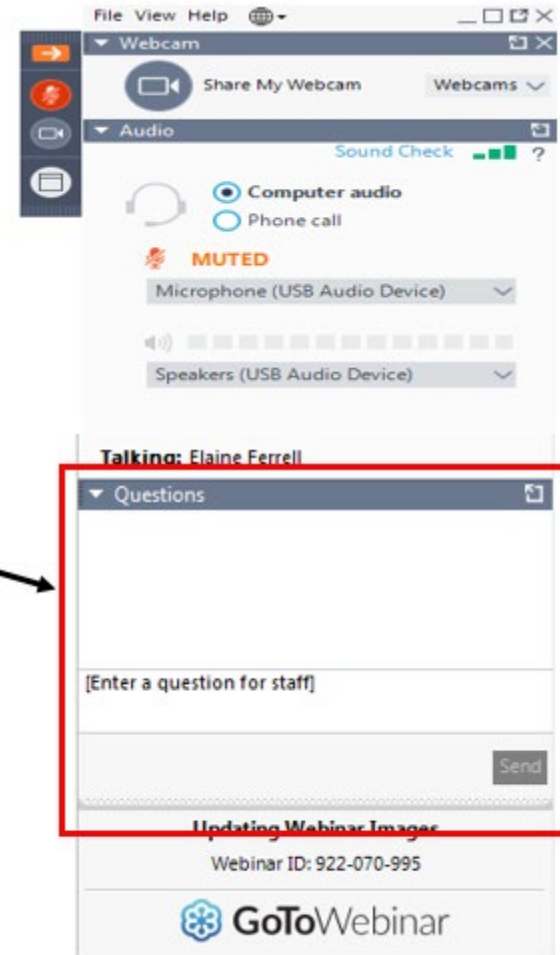
REGISTERED CONTINUING EDUCATION PROGRAM

Learning Objectives

- Implement current e-ticketing practices

Questions and Answers

- Please type your questions into your webinar control panel
- We will read your questions out loud, and answer as many as time allows



Today's presenters



Matt Miller
matthew.miller@iowadot.us
*Iowa Department of
Transportation*



Patrick Icenogle
patrick.icenogle@LA.gov
*Louisiana Department of
Transportation and Development*



Kathryn Weisner
kathryn.weisner@dot.gov
FHWA Resource Center

Thomas Murphy
tjmurphy@nd.gov
*North Dakota Department of
Transportation*



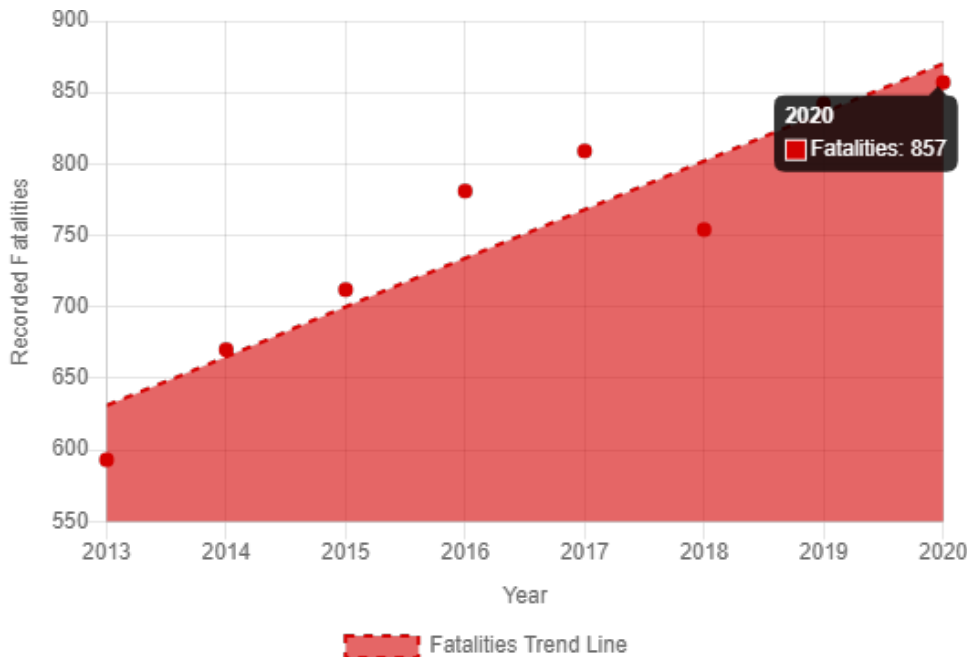
E-ticketing
& Safety



Do you
know
anyone
who was
hurt on
the job?



National Fatalities Resulting from Work Zone Crashes



Work zone fatalities reached a 16-year high in 2020.

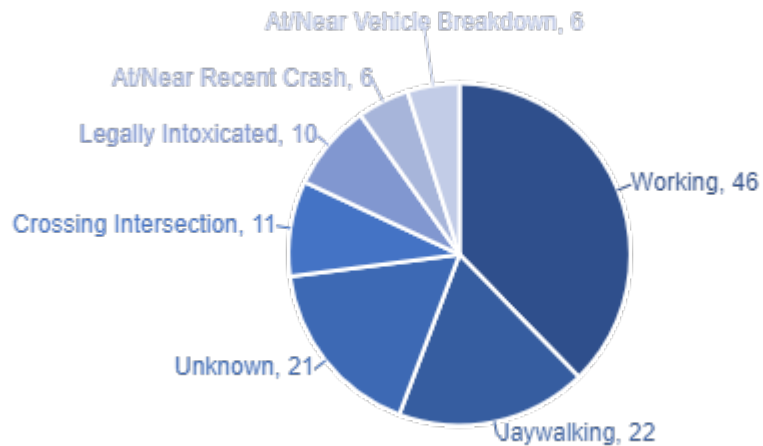
Between 2013 and 2020, work zone fatalities increased 45%.

In 2020, over 102,000 work zone crashes were estimated to have occurred resulting in over 45,000 injuries and 857 fatalities.

Economic costs of these crashes have been estimated at over \$17.5 billion annually.

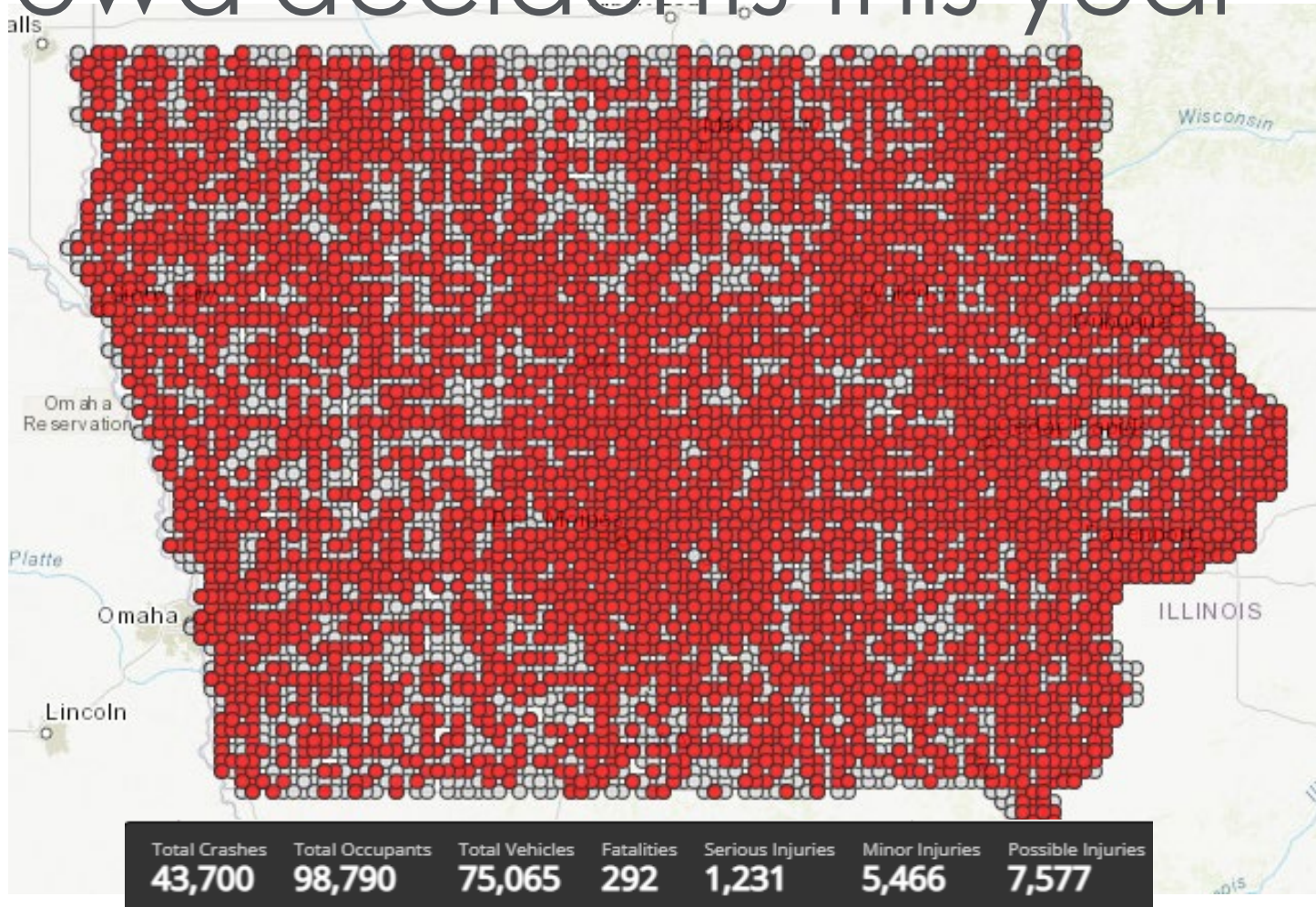
38% of National Pedestrian Work Zone Fatalities occurred while working.

Primary Activity of the 122 Pedestrian Work Zone Fatalities (2018)

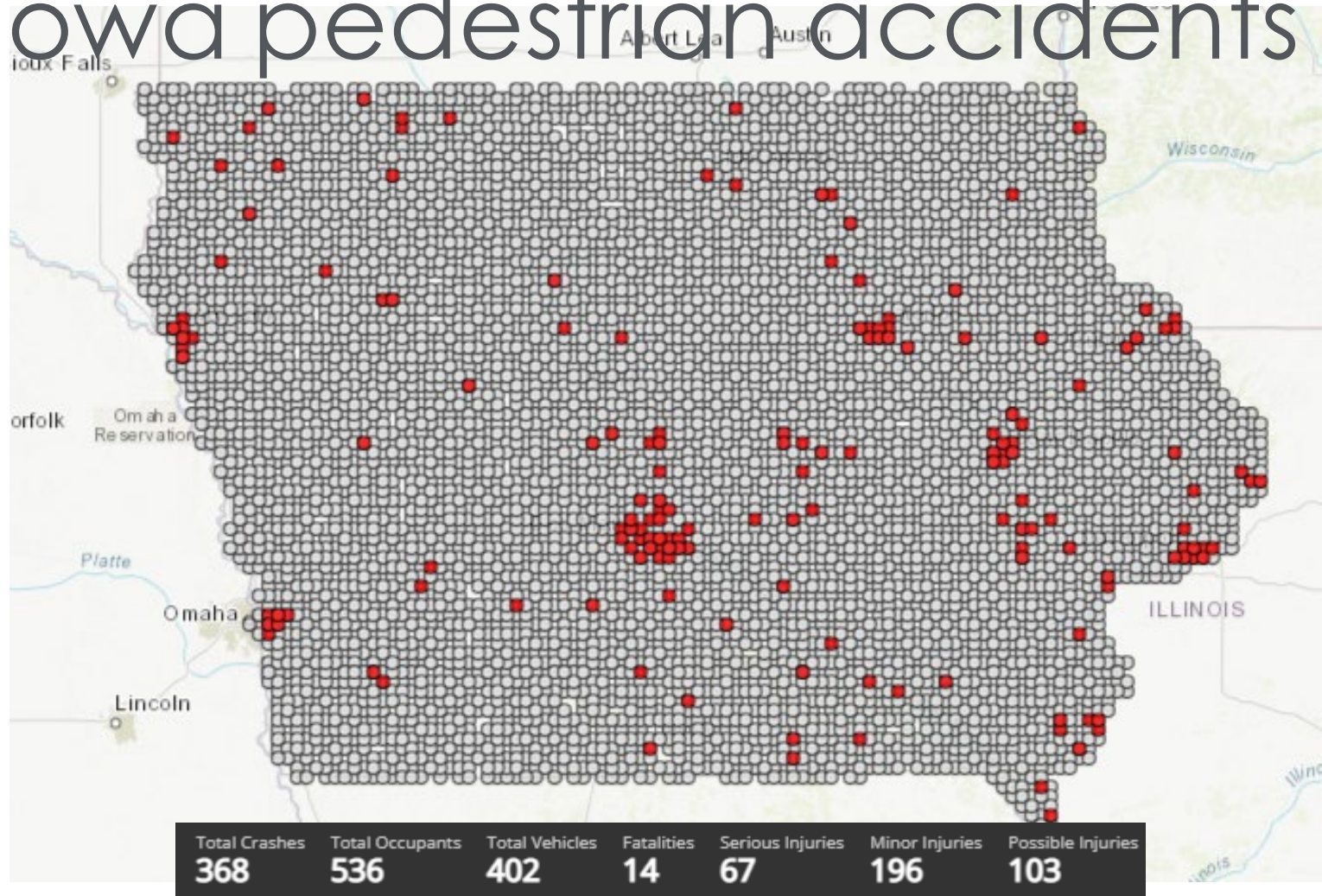


The majority of Working Pedestrian Fatalities in Work Zones were engaged in road work, utility work, planning/surveying. (87%, 40 of 46 Working Pedestrians).

Iowa accidents this year

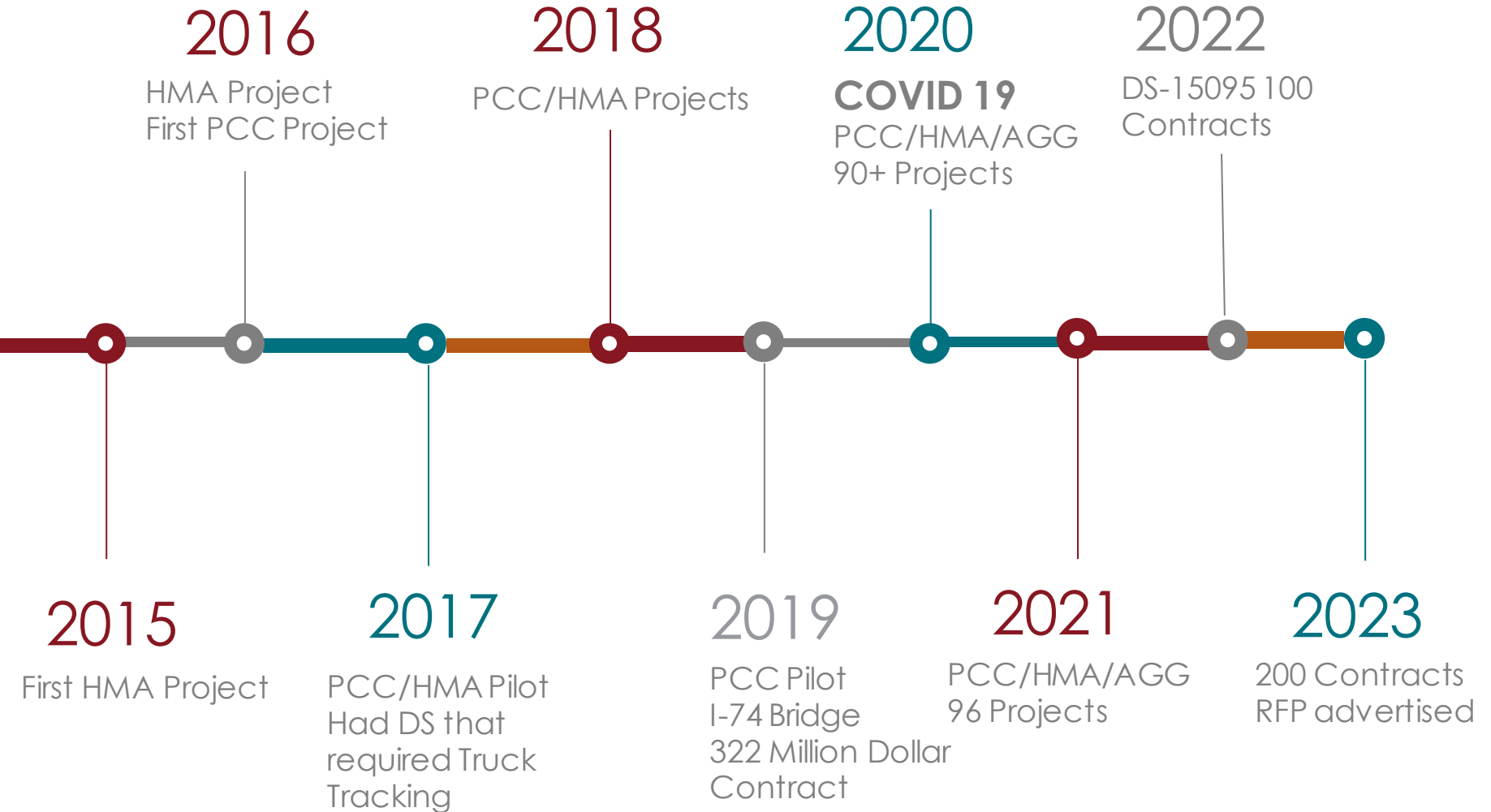


Iowa pedestrian accidents





E-ticketing



PDF ticket

Plant: 141
Truck: 141
Driver: Pamela, Carlos
Order #: 635
Customer: 1701090
Project: 071825
Project Name: Dixi Shores - 80 YD
 Park Ave

MADE TO: Sternquist Construction
BLUMER TO: 80 YD Park Ave Dixi Shores, IA

PRODUCT NO.	QTY	UNIT	DESCRIPTION	UNIT PRICE	AMOUNT
DC0025A	10	cy	C-80 3-AGG SA-M, 5-1/2" WR 1-1/2" Res		
230	10	cy	Hauling Charge		

INSPECTION ON SITE
 INSPECTOR: Ryan Lohr
 DATE: 08/25/2017
 TIME: 10:30 AM

BHB
 BULKY - READY MIX CONCRETE
HARRIS READY MIX CO.
 CENTRAL OFFICE: 200 WEST HIGHT DR., DAVENPORT, IOWA 50802 - PHONE 646-022-1388
 DELIVERY INSTRUCTIONS

MATERIALS

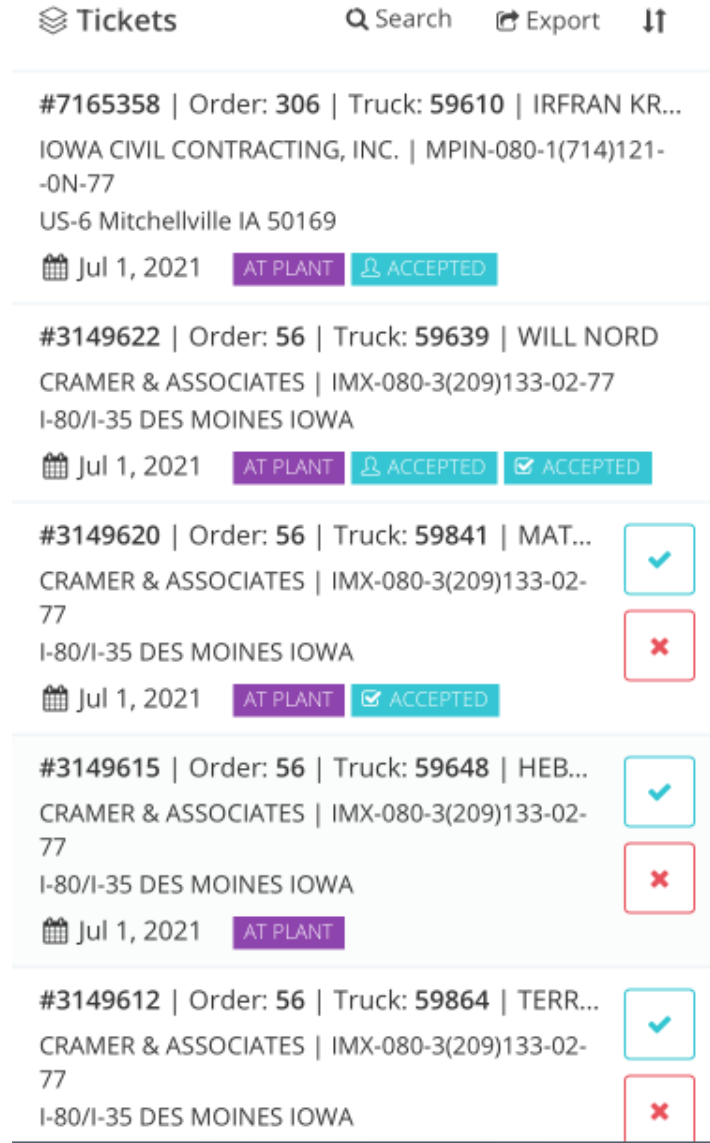
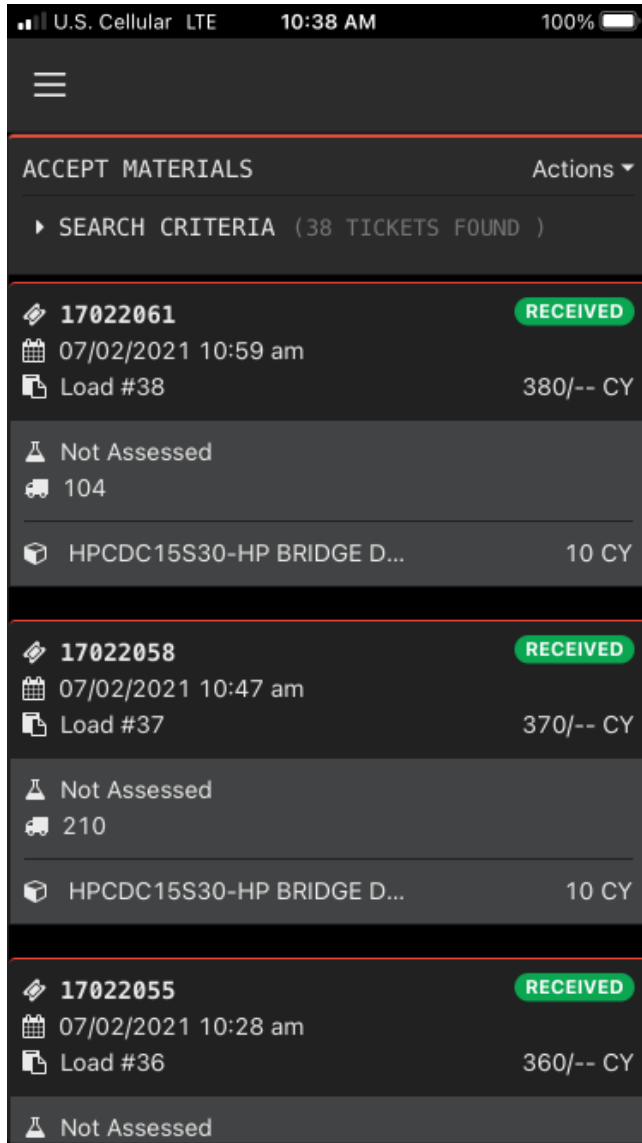
ITEM	QUANTITY	UNIT	PRICE	AMOUNT
10000	10.00	CY	12.00	120.00
10001	10.00	CY	1.00	10.00

ADDITION OF WATER: 10 GAL

IMPORTANT TERMS AND CONDITIONS:
 TRACK RETURN - Customer agrees to provide properly provided area or receptacle to wash and remove any residual material from the delivery vehicle.
 PROPERTY DAMAGE - Customer agrees to maintain a suitable roadway to point of delivery and accepts all responsibility for truck damage and property damage between curb and point of delivery.

BATCH DATA:
 Material: 10000, 10.00, 12.00, 120.00
 Material: 10001, 10.00, 1.00, 10.00
 Total: 20.00, 130.00

E-ticketing and Safety



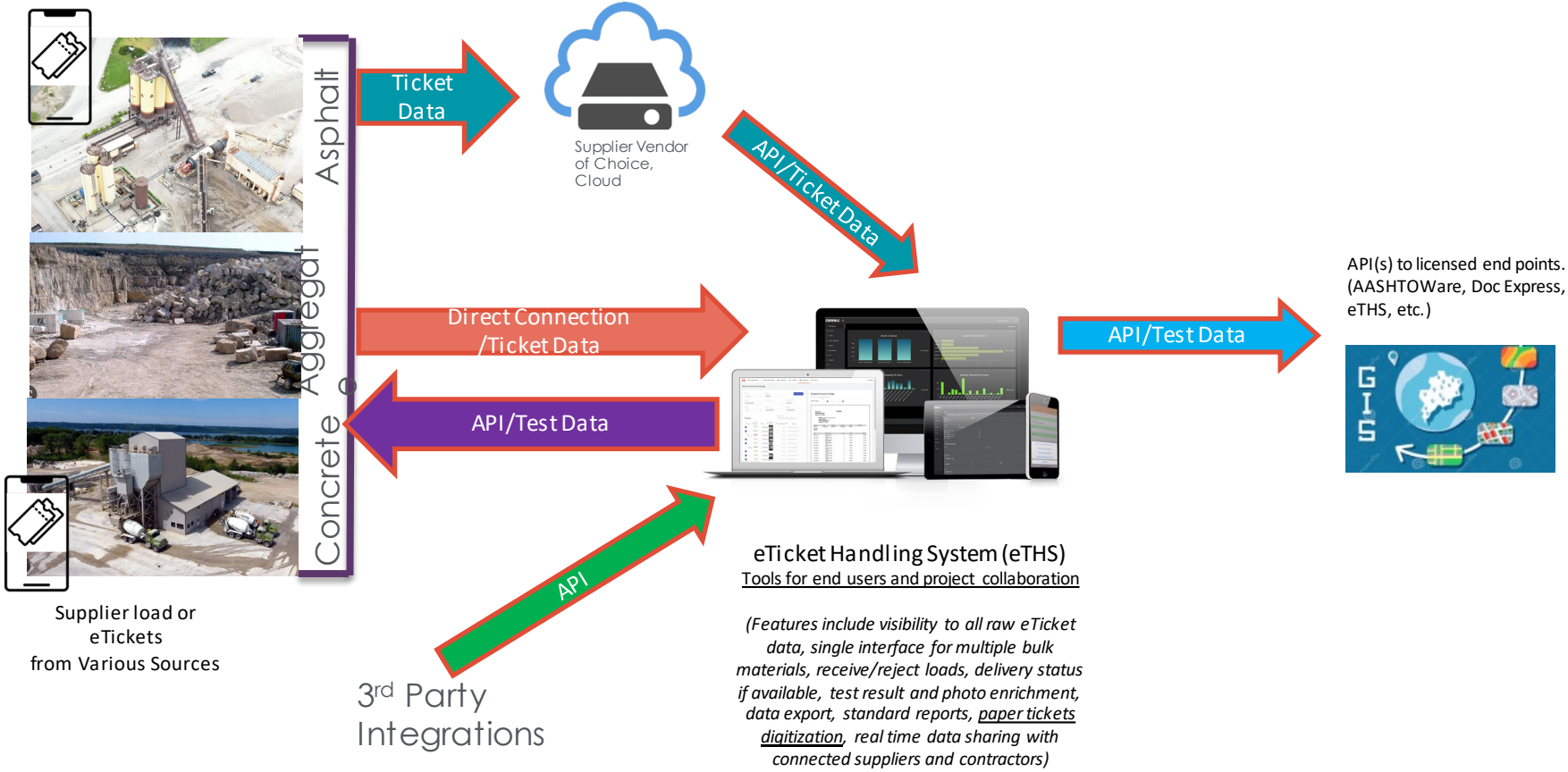
ACCEPT CRITERIA	ADDITIONS
<p>▸ SEARCH CRITERIA (172 TICKETS FOUND)</p>	
<p>🔗 80290056</p> <p>📅 10/24/2022 5:11 pm</p> <p>📄 Load #-- --/-- --</p> <p>📄 NHSX-376-1(11)--3H-97 / NHSX-376-1(11)--3...</p>	<p>PENDING</p>
<p>⚠️ Not Assessed</p> <p>🚚 140087 IOWA CARRIER</p>	
<p>📦 THINLIFT-THIN LIFT</p>	<p>16.13 TN</p>
<p>🔗 80290055</p> <p>📅 10/24/2022 5:03 pm</p> <p>📄 Load #-- --/-- --</p> <p>📄 NHSX-376-1(11)--3H-97 / NHSX-376-1(11)--3...</p>	<p>PENDING</p>
<p>⚠️ Not Assessed</p> <p>🚚 140096 IOWA CARRIER</p>	
<p>📦 THINLIFT-THIN LIFT</p>	<p>16.35 TN</p>
<p>🔗 80290054</p> <p>📅 10/24/2022 4:55 pm</p> <p>📄 Load #-- --/-- --</p> <p>📄 NHSX-376-1(11)--3H-97 / NHSX-376-1(11)--3...</p>	<p>PENDING</p>
<p>⚠️ Not Assessed</p>	

E-ticketing platforms

Over 15 different E-ticketing vendors and counting. Training and support not provided.

Some built in-house with IT personnel.

Many are direct connected. Meaning they are not using an E-ticket platform.



DS-15095
(Replaces DS-15091)

IOWA DOT

**DEVELOPMENTAL SPECIFICATIONS
FOR
ELECTRONIC TICKETING**

**Effective Date
December 21, 2021**

THE STANDARD SPECIFICATIONS, SERIES 2015, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE DEVELOPMENTAL SPECIFICATIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

15095.01 DESCRIPTION.

- A.** This work shall consist of providing electronic material tickets for all loads of flexible paving mixture or ready mixed PCC delivered to the project. Electronic ticketing will only be required for the primary material supplied to the project, i.e. flexible paving mixture for an HMA resurfacing project or PCC for a PCC paving project. Electronic tickets for other materials supplied to a project may be submitted at the Contractor's option. The Contractor/supplier can use the plant ticketing system of their choice to create the material ticket data.

DS targeted primary
material

DS explained API and rules

B. Ticket data shall include the following:

1. After each truck is loaded, ticket data must be electronically captured, and ticket information uploaded via web service / Application Programming Interface (API) to the agency.
2. Material ticket data will be submitted to <https://iowa.ticketing.gov> <https://iowa.dot-portal.io> via an HTTPS POST as JSON documents. Include the API key specific to each customer in each request as an HTTP header.
3. Material supplier must test to confirm that ticketing data can be shared from the originating system no less than 30 days prior to project start. Topic shall be discussed at the pre-construction meeting.
4. Ticket data must be available immediately upon project start so there are no delays to viewing tickets.
5. Provide the same data that is currently accessible and viewed by agency users previously on printed tickets specific to state projects.
6. Transmit ticket data before the truck leaves the plant and transmit any updates to the ticket data within 5 minutes of a change.

DS ticket requirements

15095.02 CONSTRUCTION DATA.

Contractor shall submit material ticket data in accordance with the plant manufacturer's system recommendations to provide the following.

- A. Net weight (or volume for ready mix concrete) of material being transported (to nearest 0.01 ton or cubic yard).
- B. Running daily total of net weight of material (or volume for ready mix concrete) being transported (to the nearest 0.01 ton or cubic yard).
- C. Each material ticket shall contain the following:
 - 1. **General Ticket information (All Material).**
 - a. Date.
 - b. Iowa DOT Project Number.
 - c. Name of Contractor
 - d. Name of material supplier.
 - e. Unique truck ID.
 - f. Plant/scale name (source).
 - g. Truck Status Times:
 - 1) Loaded time (time batched) shall be available.
 - 2) Provided other truck status times as available.
 - a) Ticketed.
 - b) Load time.
 - c) Left plant.
 - d) Arrive at project.
 - e) Begin unload.
 - f) Finish unload.
 - g) Leave project.

Information required on a PCC E-ticket

1. Date
2. Iowa DOT Project number
3. Contractor
4. Supplier
5. Unique truck ID
6. Plant/Scale
7. Truck status times
8. Wet weights
9. Dry weights
10. Water in Agg
11. Total water
12. W/C ratio
13. Max W/C ratio
14. Allowable water to add.
15. Admixture Retarder and weights.
16. Water reducer and weights.
17. Air entrainment and weights.
18. Special performance admixtures and weights.
19. Concrete fibers.
20. Cementitious material and weights.
21. CPI name and cert number.

Information on an HMA E-ticket

1. Date
2. Iowa DOT Project number
3. Contractor
4. Supplier
5. Unique truck ID
6. Plant/Scale
7. Truck status times
8. Type of material
- 9.-11. Gross/Tare/Net
12. Mix Design number

Currently
capable of
getting 275
lines of data
fields on E-
ticket

237	Test Data Slump Result 1		4.0
238	Test Data Slump Result 1 Unit of Measure	INH	
239	Test Data Slump Result 2		
240	Test Data Slump Result 2 Unit of Measure		
241	Test Data Material Temperature Result 1		79
242	Test Data Material Temperature Result 1 Unit of Measure	FAH	
243	Test Data Material Temperature Result 2		
244	Test Data Material Temperature Result 2 Unit of Measure		
245	Test Data Ambient Temperature Result 1		
246	Test Data Ambient Temperature Result 1 Unit of Measure		
247	Test Data Ambient Temperature Result 2		
248	Test Data Ambient Temperature Result 2 Unit of Measure		
249	Test Data Humidity		
250	Test Data Humidity Unit of Measure		
251	Test Data Wind		
252	Test Data Wind Unit of Measure		
253	Test Data Efflux		
254	Test Data Efflux Unit of Measure		
255	Test Data Evaporation Rate		
256	Test Data Evaporation Rate Unit of Measure		
257	Test Data Latitude Position		42.0300216
258	Test Data Longitude Position		-93.612787
259	Invoice Code		
260	Load #		1
261	Product Cost Code		
262	Haul Cost Code		
263	Product Unit Cost		
264	Haul Unit Cost		
265	Mix ID		
266	Specific Gravity		
267	Certification Statement		
268	Address	I280	
269	Address 2		
270	City	DAVENPORT	
271	State / Province	IA	
272	Postal Code		
273	Country	US	
274	Instructions		
275	Delivery Option		
276			

Lessons from the DS

- How to handle when internet connection is lost.
- Add a flow chart for contractor.
- Explain the importance of consistent project numbering.

2022 E-Ticketing

- 100 contracts
- 25 different vendors connected
- This includes some County and Cities
- Over 1 Million tons of HMA
- Over 27k CY of Ready-mix Concrete
- Over 57k tickets
- Just this year.

Email

Subject E-ticketing Iowa DOT Portal



Name,

You are receiving this e-mail because you have been invited to the new Iowa DOT E-Ticket handling system. This system goes along with the new Iowa DOT portal (DS-15095) for any supplier using any e-ticketing program to share the ticket data to one source for inspection. You will receive a few e-mail invites from no_reply@commandalkon.io with your username (e-mail) and temporary password to log into the system. Attached are instructions for getting set up on both your computer using Chrome and your iPhone/iPad using Connex after downloading it from the app store. If you could download the app and bookmark Connex before the training that would be appreciated. You should get two welcome e-mails from the link above for two "companies", one being your office name and the other being a training "company" that we will utilize. The instructions attached go through how to change companies for your office to the training site.

Here is a link to some training video's that Cedric put together a while back. Some of them need to be slightly updated with new logo's but the majority of it is the same content.
[W:\Highway\Construction\Inspection Tools\E-Tickets\Connex](#)

Here is a link to the training we held for Grimes in July 2022. [IMX-235-2\(670\)12-02-77 InRoads E-ticketing training-20220717 180149-Meeting Recording.mp4](#) Let me know when and if you would like to set up formal training, we can do TEAMS or in-person.

Thanks,



MATTHEW MILLER, CPM
 E-CONSTRUCTION COORDINATOR
 CONSTRUCTION & MATERIALS BUREAU

iowadot.gov

[f](#) Iowa Department of Transportation

Office: 515-233-7843

[t](#) @iowadot

[i](#) @iowadot

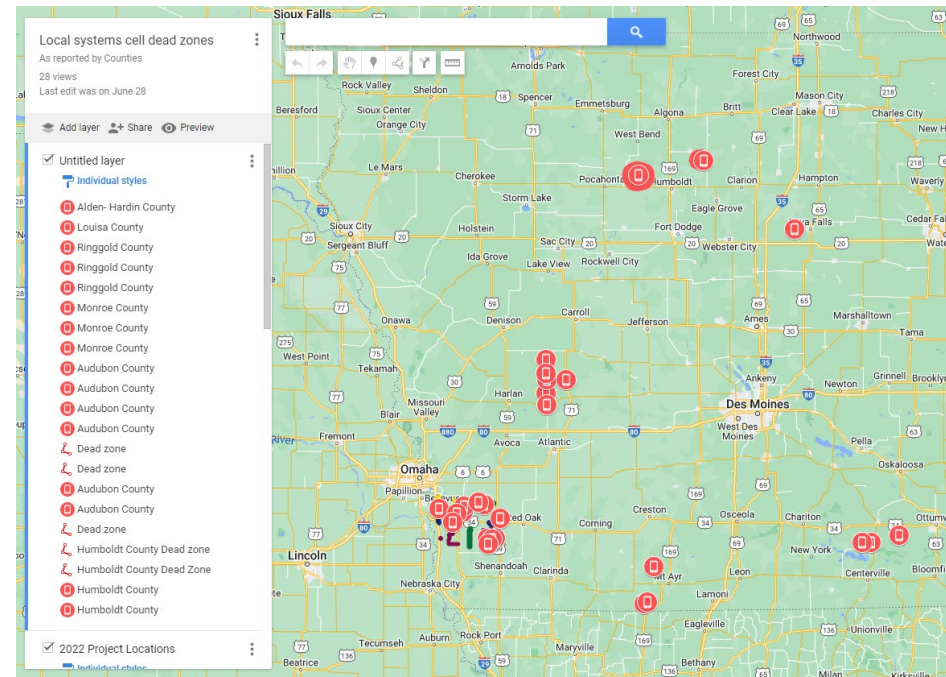
Cell: 515-231-3980

Dashboard information



Internet Connection

- Reached out to offices to find dead zones on upcoming jobs.
- Created map for cell providers.



Internet Connection



Internet Connection



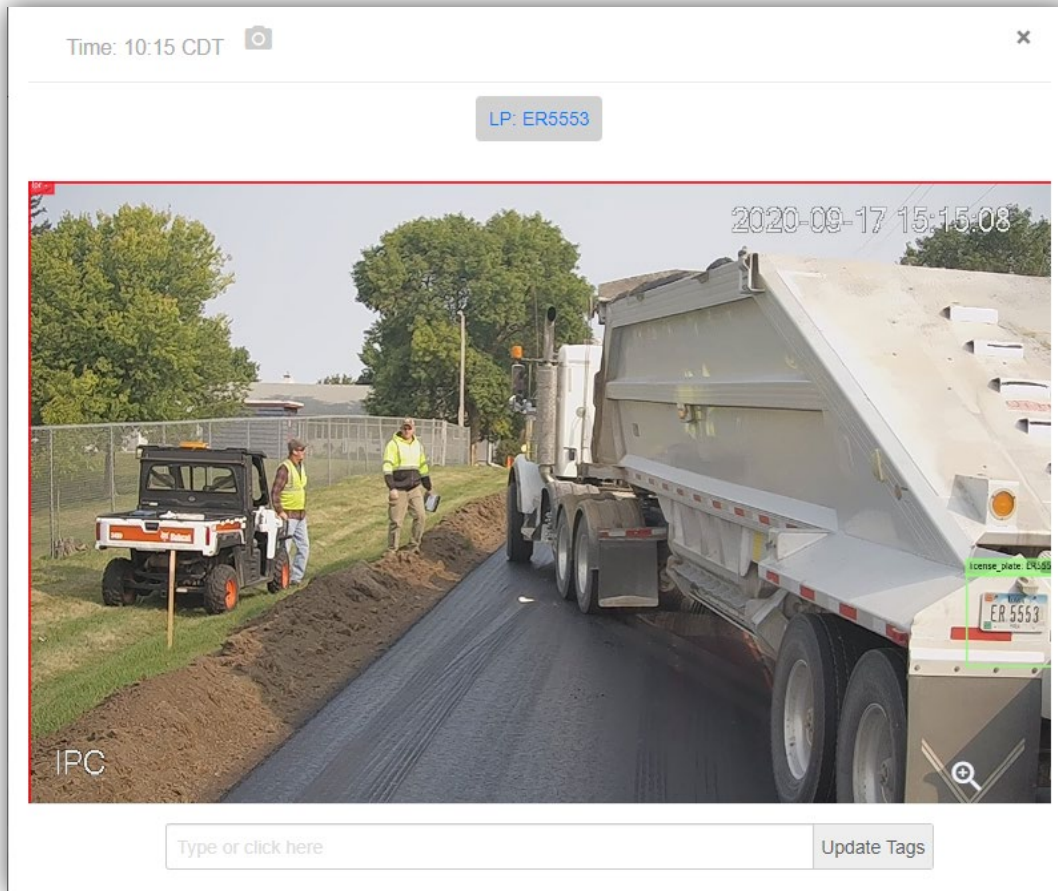
Integrations

- Camera, App or GPS received loads.
- OnStation station location and offset when receiving.
- AASHTOWare Project item and DBE trucking information.
- ESRI FME output information.

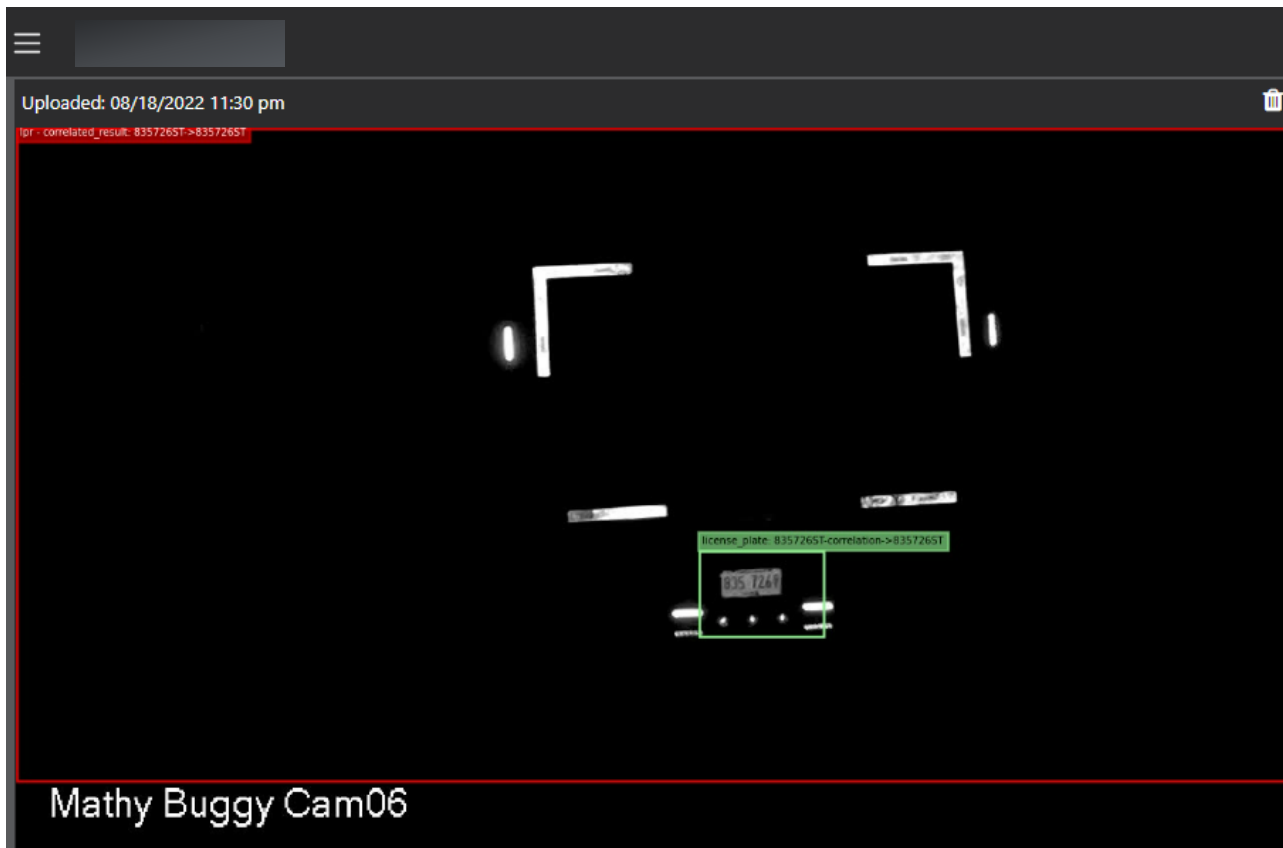
At the Plant



At the Job Site



Night shift job Site



OnStation



Specific Changes

- DS-15095.
- Elimination of 3-4 forms.
- Moving towards a General Specification in two years.
- Working with local systems and their requirements.

Specific Changes

- Considerations to ticket data and standardization.
- Integrations with emerging contract admin software.
- DBE truck tracking.

Doc Express

x

Supporting Documents

PCC (722) Midwest Bard plant 150 10-5-22

PCC (722) Midwest Bard plant 150 10-6-22

PCC (722) Midwest Bard plant 150 10-7-22

Add supporting document

AASHTOware integration

Contract Daily Work Report Summary

Contract: e-Ticketing - Concrete e-ticketing demo Save ?

DWR Date: 06/05/2021 Inspector: sfarmerie-iti Sequence: 1 Status: Draft

General
Notes
Contractors On Site
Contractor Equipment
Contractor Personnel
Postings
Acceptance Records
Force Account Contractors

Q Type search criteria or press Enter Advanced Showing 1 of 1

Select Items... 0 marked for deletion 0 changed

Item ID	Item Description	Project	Category	Records	Curr Qty	Unit Price
415 0060	Concrete Pavement 6-Inch	e-ticketing derr	01	1	10,000.000	20.00000
Cont Item ...	Supplemental Description	Total Qty Po...	Total Qty Po...	Total Qty Pa...	Amount Pai...	Proj Ln Num
0001		0.000	0.000	0.000	0.00	0001

Item Posting N...	Contractor	Station/Location	Quantity Posted
1	AA07 - A & A CONCRETE & LANDSCAPING, INC. (Prime)	approach ramp	

Contractor ▼
 A & A CONCRETE & LANDSCAPING, INC. (Prime) ▼

Quantity Posted ▼

Station From ▼

Station To ▼

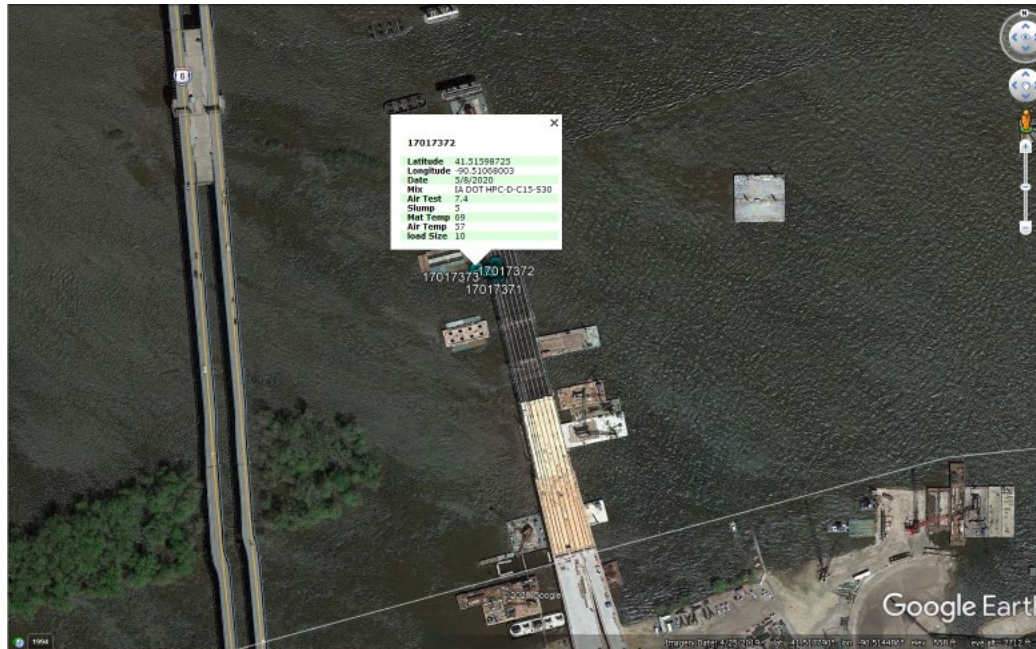
Units
 SY

Agency Views
 Optional

Location ▼
 approach ramp

Actions ✕
 Delete
 Duplicate Row
 Insert Row
 Views
 Attachments (1)
Concrete Tickets
 Links
 Tracked Issues

Creating outputs for long-term asset management.



ESRI map for pavement

Added security | https://egis.iowadot.gov/geocortex/webviewer/?app=83a54e74419046cd94abed4e024e0644

Iowa DOT Favorites | Iowa Regional Coord... | Monthly Letting Pla... | SYNCHRO Control | PIX4Dcloud | DocExpress | Excel To KML | ThinkIQ Vision Portal | Bentley | Infrastruct... | Welcome to AASHT... | Contract Progress S... | TTCP | List of Lettings - Bi... | OnStation

03511111 75112 7285

I want to...

Zoom to Result(s) | Export to CSV | Export to XLSX | Pulse | Remove Result(s) | Add Focus | Remove Focus | Define Custom Command

OBJECTID: 196	ORIGKEY: 03511111 75112 7285
PAVEMENT MANAGE... 2021	ROUTE ID: S001910035N
FROM MEASURE: 111.708	TO MEASURE: 112.6739
HIGHWAY SYSTEM: 1	ROUTE: 35
DIRECTION: 1	BEGINNING MILEPO... 111 75
ENDING MILEPOST: 112 72	PAVEMENT TYPE: 3A
DESCRIPTION: From JCT I-35/US 30 ...	CONSTRUCTION YEAR: 1988
RESURFACING YEAR: 2017	GEOMETRY LENGTH: 0.97
LANE MILES: 2.17	MAINTENANCE REGI... 1
COUNTY NUMBER:	CITY NUMBER:

Scale: 87286

X/Y (WKID: 102100) X: -10431644.60 Y: 5163995.88

Better Documentation

AutoSave: ON 74_Example_E-Ticketing.xlsx - Saving... Wilkinson, Cedric

File Home Insert Draw Page Layout Formulas Data Review Design View Developer Help BLUEBEAM ProjectWise ACROBAT Power Pivot Tell me Share Comments

L4 =SUBTOTAL(109, \$L\$10:\$L\$20001)

Iowa DOT PCC Ticket Summary

Project	Project #	Total CY Estimated	695.00	Location	From	145+50	To	146+50
Contract ID	82-0741-199	Total CY Batched	709.50	Sample Freq.	30	Pick Below		Air/Slump
Contractor	CIVIL CONSTRUCTORS / 00122	Total CY used	694.50	Air Required	24	Structural Concrete	1/30 yd3 (2)	
Supplier	HAHN READY MIX	Yield	100%	Slump Required	24	Fixed		
IMPORT DAILY TICKETS		Total # of Air	36.00	Total Water Added (Gal)	280.00	Structure	5/T 15	
		Total # of Slump	32.00	Total Water Added (Lbs/CY)	3.36			

Date	Load #	Ticket #	Truck #	Location	Plant	Mix #	CY	Waste	Total CY	Loaded	Discharged	Pcy Item	Air 1	Air 2	Slump 1	Slump 2	Water (Gal)
10/17/2019	1	17016649	121	0 17 / MOULINE PLANT	BR-C15-S20 BARRIER RAIL		10		10	12:00 AM	5:00 AM	0					0
10/17/2019	2	17016650	121 East Side Barrier	17 / MOULINE PLANT	BR-C15-S20 BARRIER RAIL		7		17	7:18 AM	8:07 AM	110	7		1		0 Pa
10/17/2019	3	17016652	115	0 17 / MOULINE PLANT	BR-C15-S20 BARRIER RAIL		8		25	7:37 AM	5:00 AM	0					0 No
10/17/2019	4	17016653	305 East Side Barrier	17 / MOULINE PLANT	BR-C15-S20 BARRIER RAIL		7		32	7:49 AM	8:28 AM	110					0 No
10/17/2019	5	17016654	340	0 17 / MOULINE PLANT	BR-C15-S20 BARRIER RAIL		8		40	8:01 AM	5:00 AM	0					0 No
10/17/2019	6	17016655	104 East Side Barrier	17 / MOULINE PLANT	BR-C15-S20 BARRIER RAIL		7		47	8:14 AM	8:50 AM	110					0 No
10/17/2019	7	17016656	207 East Side Barrier	17 / MOULINE PLANT	BR-C15-S20 BARRIER RAIL		7		54	8:35 AM	9:26 AM	110	7.2		1		0 Pa
10/17/2019	8	17016658	121 East Side Barrier	17 / MOULINE PLANT	BR-C15-S20 BARRIER RAIL		7		61	8:55 AM	9:47 AM	110					0 No
10/17/2019	9	17016660	118 East Side Barrier	17 / MOULINE PLANT	BR-C15-S20 BARRIER RAIL		7		68	9:37 AM	10:33 AM	110					0 No
10/17/2019	10	17016662	305 East Side Barrier	17 / MOULINE PLANT	BR-C15-S20 BARRIER RAIL		7		75	9:58 AM	10:51 AM	110					0 No
10/17/2019	11	17016663	352 East Side Barrier	17 / MOULINE PLANT	BR-C15-S20 BARRIER RAIL		7		82	10:14 AM	11:09 AM	110	7.6		1.25		0 Pa
10/17/2019	12	17016664	104 East Side Barrier	17 / MOULINE PLANT	BR-C15-S20 BARRIER RAIL		7		89	10:47 AM	11:30 AM	110					0 No
10/17/2019	13	17016665	121 East Side Barrier	17 / MOULINE PLANT	BR-C15-S20 BARRIER RAIL		7		96	11:12 AM	11:50 AM	110					0 No
10/17/2019	14	17016668	353 East Side Barrier	17 / MOULINE PLANT	BR-C15-S20 BARRIER RAIL		7		103	11:35 AM	12:24 PM	110	7.3		1		0 Pa
10/17/2019	15	17016671	123 East Side Barrier	17 / MOULINE PLANT	BR-C15-S20 BARRIER RAIL		7	3	110	11:58 AM	12:49 PM	110					0 No
10/17/2019	16	17016675	104	0 17 / MOULINE PLANT	BR-C15-S20 BARRIER RAIL		10		120	12:00 AM	5:00 AM	0					0
10/17/2019	17	17016676	104 Unit C East barrier	17 / MOULINE PLANT	BR-C15-S20 BARRIER RAIL		8		128	12:36 PM	1:23 PM		7.4		1		3 No
10/17/2019	18	17016678	122	0 17 / MOULINE PLANT	BR-C15-S20 BARRIER RAIL		8		136	1:13 PM	5:00 AM	0					0 No
10/18/2019	19	17016689	123 Unit C East Barrier rail	17 / MOULINE PLANT	BR-C15-S20 BARRIER RAIL		8		144	7:30 AM	8:20 AM	120	7.2		1.25		0 Pa
10/18/2019	20	17016690	120 Unit C E. Barrier	17 / MOULINE PLANT	BR-C15-S20 BARRIER RAIL		8		152	7:53 AM	8:39 AM	120					0 No
10/18/2019	21	17016691	110 Unit C E. Barrier	17 / MOULINE PLANT	BR-C15-S20 BARRIER RAIL		8		160	8:13 AM	8:59 AM	120	6.3		1.25		0 Pa
10/18/2019	22	17016692	106	17 / MOULINE PLANT	BR-C15-S20 BARRIER RAIL		8		168	8:38 AM	9:35 AM						0 No
10/18/2019	23	17016693	117 P3 column 3 patch repair	17 / MOULINE PLANT	HPC O TERNARY		1.5		177.5	8:45 AM	9:45 AM	360	7.8		7		2 Pa
10/18/2019	24	17016696	304	17 / MOULINE PLANT	BR-C15-S20 BARRIER RAIL		8		177.5	9:10 AM	9:55 AM				1.5		0 No
10/18/2019	25	17016698	110 Unit C E. Barrier	17 / MOULINE PLANT	BR-C15-S20 BARRIER RAIL		8		185.5	9:48 AM	10:23 AM	120					0 No

Summary Tickets E115 Raw Data

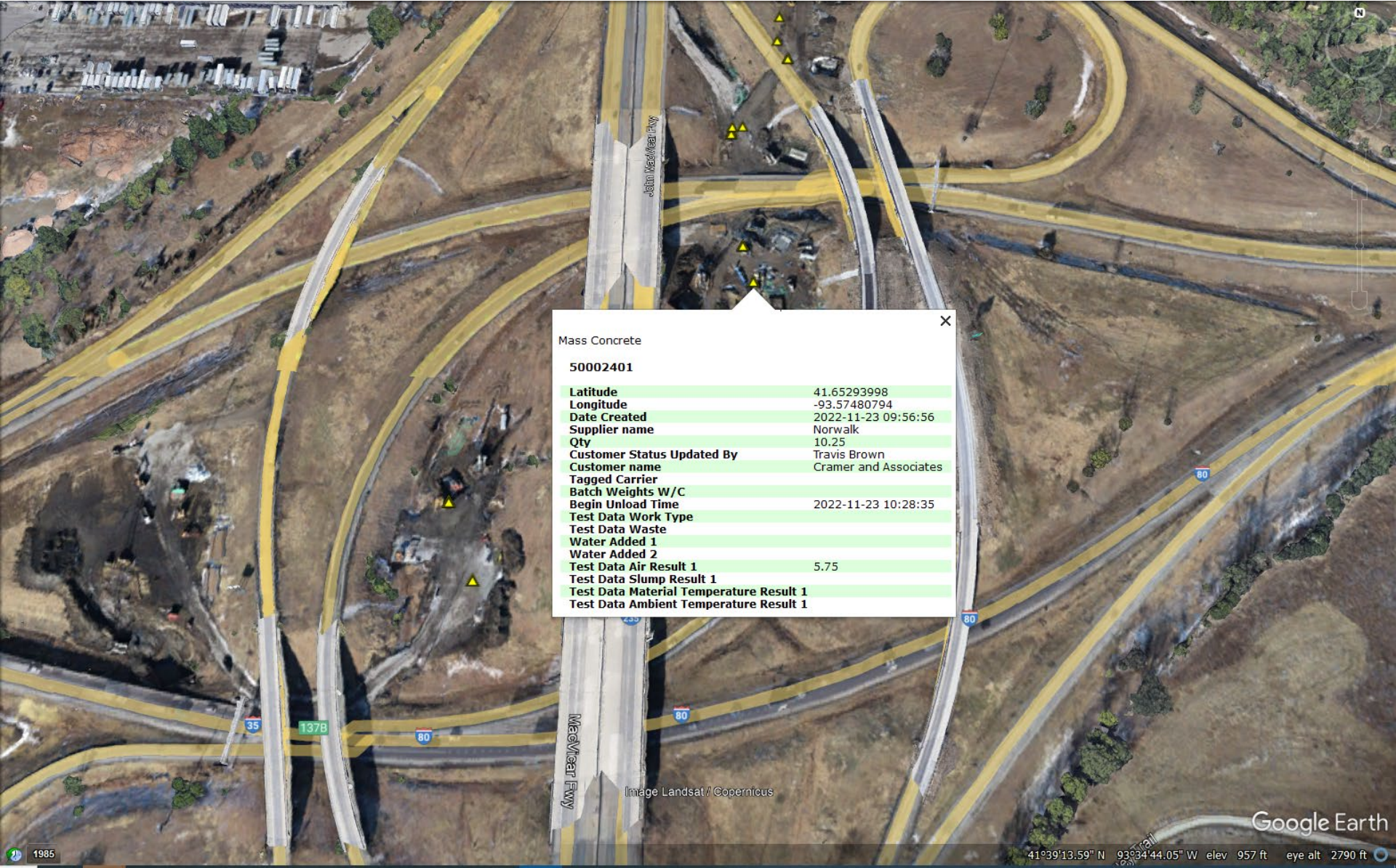
5:03 PM 1/20/2020

E-ticketing



E-ticketing





Successes

From: Staebler, Steven <Steven.Staebler@iowadot.us>

Sent: Wednesday, August 24, 2022 2:13 PM

To: Miller, Matthew <Matthew.Miller@iowadot.us>

Cc: Wilkinson, Cedric <Cedric.Wilkinson@iowadot.us>; Lamping, John <John.Lamping@iowadot.us>; Greene, Jeremy <Jeremy.Greene@iowadot.us>; Walberg, Ryne <Ryne.Walberg@iowadot.us>

Subject: HMA E-Ticketing

Why Not? Work some more kinks out.

Pelling is willing and Jeremy hasn't lost his mind yet.

Thx

Steve

THANK YOU FOR YOUR TIME AND ATTENTION



Matthew Miller
E-construction Coordinator
IOWA DOT

Louisiana Department of Transportation and Development E-Ticketing Demonstration Projects

Patrick Icenogle, PE, MSCE

E-Construction Engineer

patrick.icenogle@la.gov

225-379-1505

Why is LADOTD interested?

- FHWA Every Day Counts Initiative
- Safety
- Quality
- Time Savings
- Data Management
 - Batch tickets are one of the few construction data pieces that LADOTD does not capture by electronic means

Safety

- Major safety push during COVID social distancing
- Inspector does not need to approach truck or dodge traffic



Quality

- Reduced errors and rework = improved accuracy of data
- Improved quality control and transparency
- Automated calculations and reports to assist field inspector
- Improved materials management for project audit
- Improved document control for ticketing audit
- Real time data for decision making and problem solving
- Collaboration of data with other technologies

Quality

- Research Technical Assistance Study
 - Randomly pulled 100 batch tickets from various projects
 - Several tickets out of batch tolerance
 - Different source than specified on mix designs
 - Missing components (admixtures, intermediate aggregates)

Quality

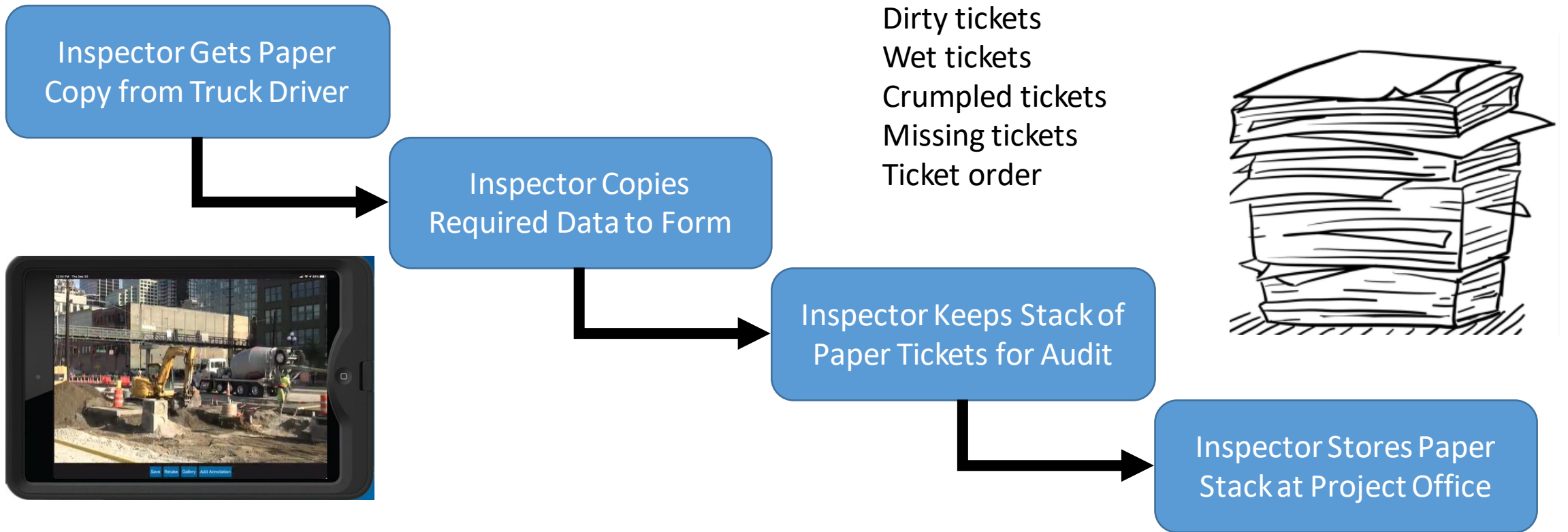
- Alkali Reactivity Mitigation
 - Louisiana began enforcing aggregate restrictions for ASR/ACR
 - Raised concerns across industry as this removed major aggregate sources
 - DOTD and Industry are evaluating e-ticketing as an effective method to ensure specified requirements for ASR/ACR mitigation are maintained



Time Savings

- Inspector perspective
 - Automated calculations
 - Automated flags for specification tolerances
 - No juggling paper stack and manual transfer of data
 - Less trips to office to drop off paper stacks = more exposure on project
- Project Office perspective
 - Access to QC data
 - Data on demand if inspector has concern
 - Summarized batch ticket report on demand
 - No need to review paper stack for project close out

Time Savings



LADOTD utilizes iPads as virtual fieldbooks

- Picture of a ticket is nice, but data is much more useful

Data Management



BENEFITS OF DATA-DRIVEN DECISION MAKING



Valuable
Insights



Continual
Growth



Improved
Program
Outcomes



Optimised
Operations

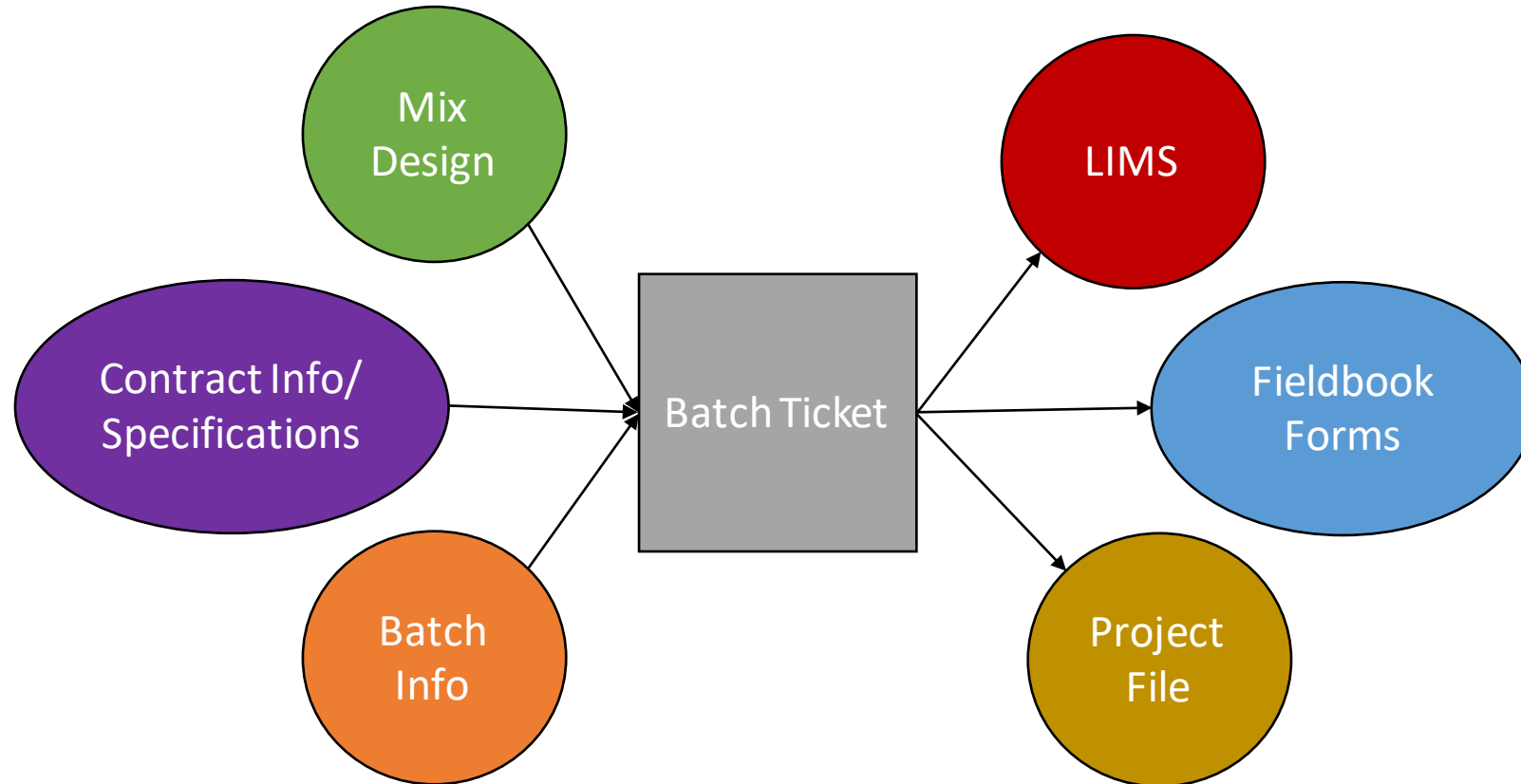


Prediction
Of Future
Trends



Actionable
Insights

Data Management



Data Management

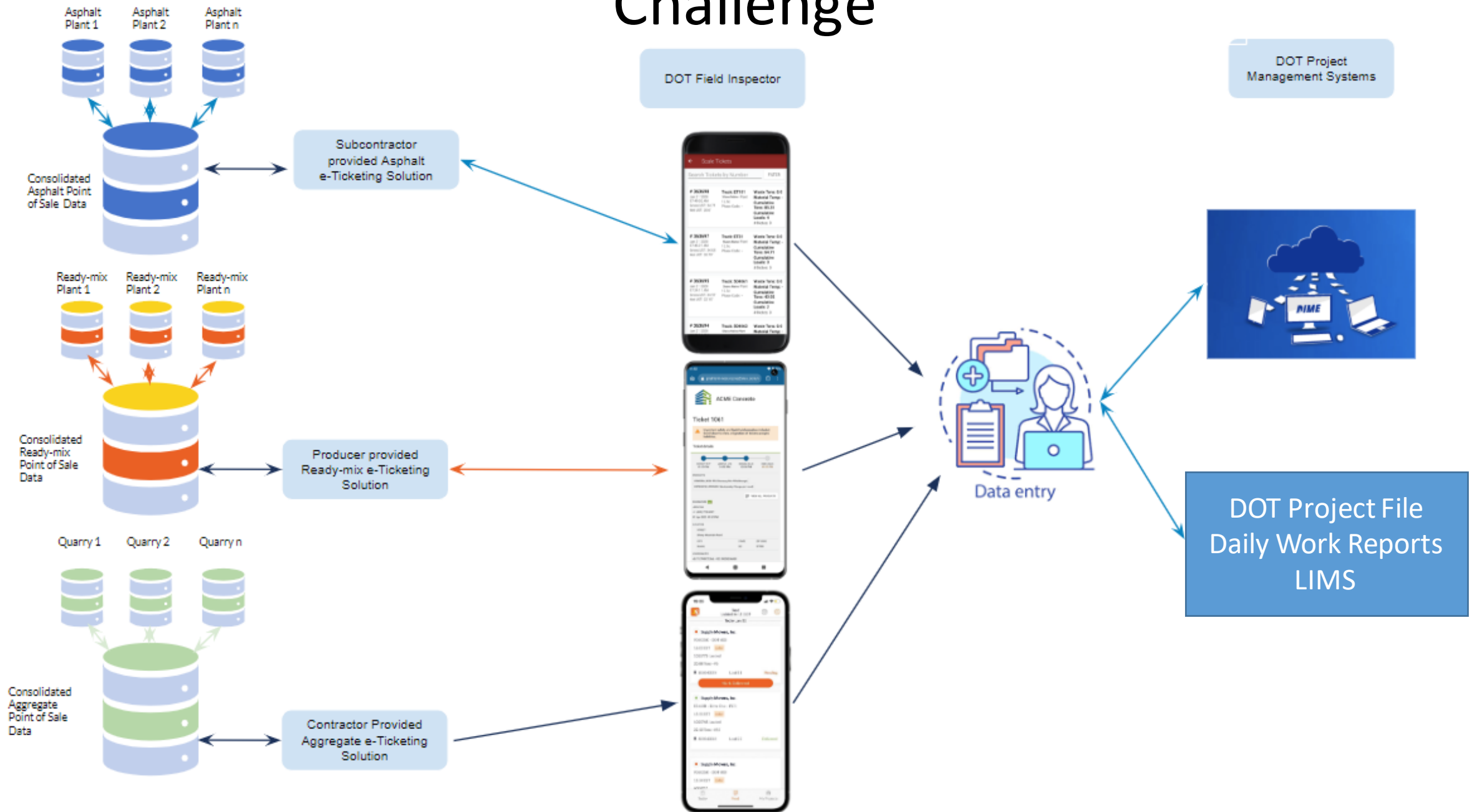
BATCH CERTIFICATION FOR PORTLAND CEMENT CONCRETE

Plant Data					
Project No:	H. 613897.6	Time Batched:	6:07 AM	Date:	11-23-2020
Plant Name:	[REDACTED]	Batch No.:	1	PCC Mix Des. No.:	0933
Location:	[REDACTED]	Batch Size:	5 yd ³	Concrete (Class/Type):	A-1
Truck No:	2001	Legal Load:	lb / yd ³	Ambient Air Temp:	°F

Batch Weights					
Cement	1450 lb	Coarse Aggr 2 (SSD)	2910 lb	Set Accelerator	oz
Fly Ash		Coarse Aggr 3 (SSD)		Superplasticizer	oz
Slag	1330 lb	Water Reducer	124 oz	Special Additive A	123 lb. gal. oz
Fine Aggr. (SSD)	6730 lb	Normal Set <input checked="" type="checkbox"/>	Set Retarder <input type="checkbox"/>	Special Additive B	lb. gal. oz
Coarse Aggr 1 (SSD)		Air Entrainment	5	Special Additive C	lb. gal. oz
Maximum Allowable Water to be Added	125 gal				

Code	Per Unit Target	Target	Batched	% Variance	% Moisture	Water Content
SAND	1355.67 LB/CY	6778.38 LB	6730 LB	-0.71	5.5	42.04 GA
PEAGRAVEL	584.91 LB/CY	2924.55 LB	2910 LB	-0.5	0.5	1.73 GA
LIMESTONE	1212 LB/CY	6060 LB	6070 LB	0.17	0	
SLAG	267 LB/CY	1335 LB	1330 LB	-0.37	0	
CEMENT	267 LB/CY	1335 LB	1450 LB	8.61	0	
WATER	18.18 GA/CY	90.91 GA	91.43 GA	0.57	0	
WR [REDACTED]	25 FL OZ/CY	125 FL OZ	126 FL OZ	0.8	0	
AD [REDACTED]	25 FL OZ/CY	125 FL OZ	123 FL OZ	-1.6	0	
AEA	0.75 FL OZ/CY	3.75 FL OZ	4 FL OZ	6.67	0	

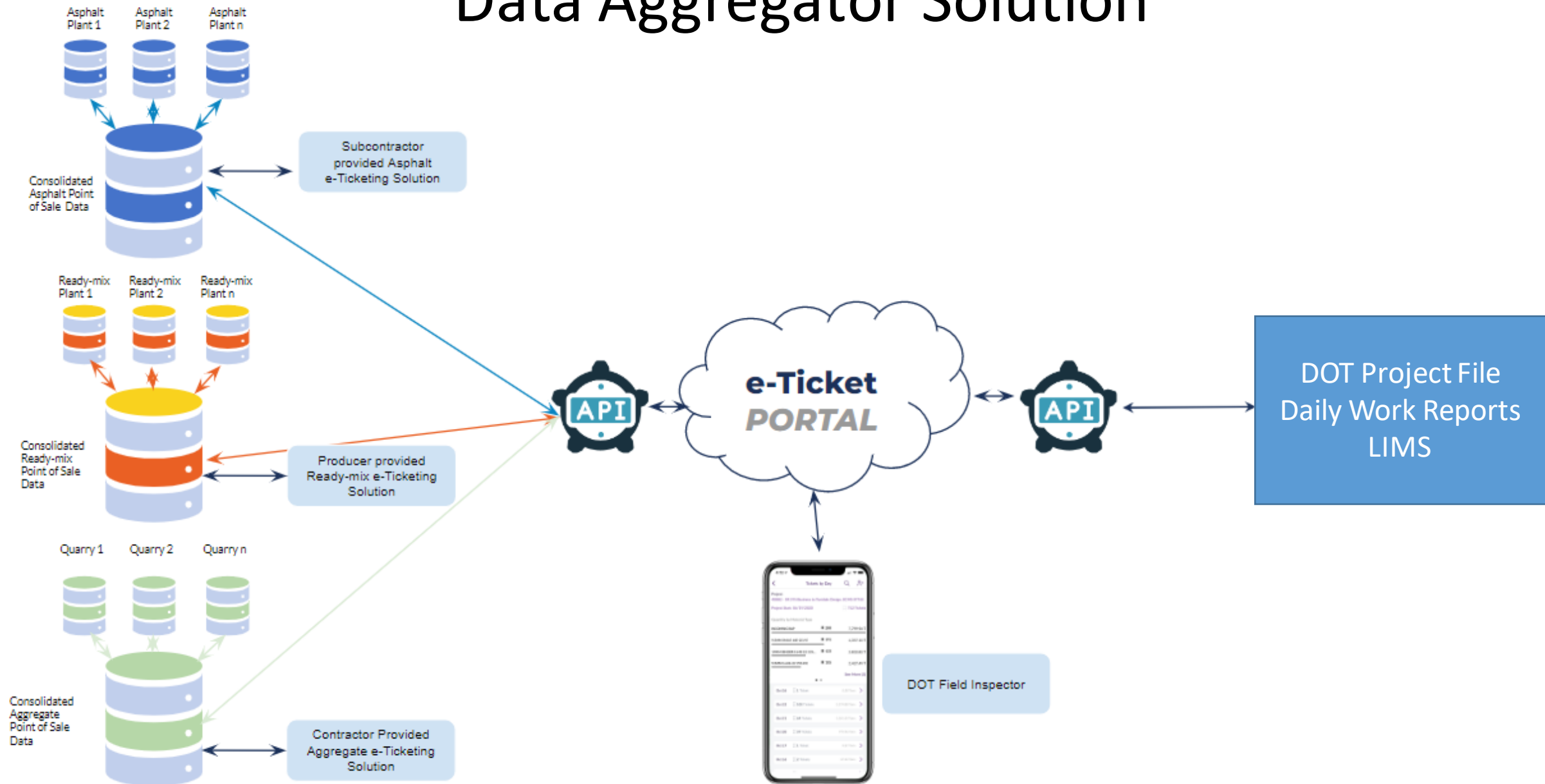
Challenge



Data Management- Challenges

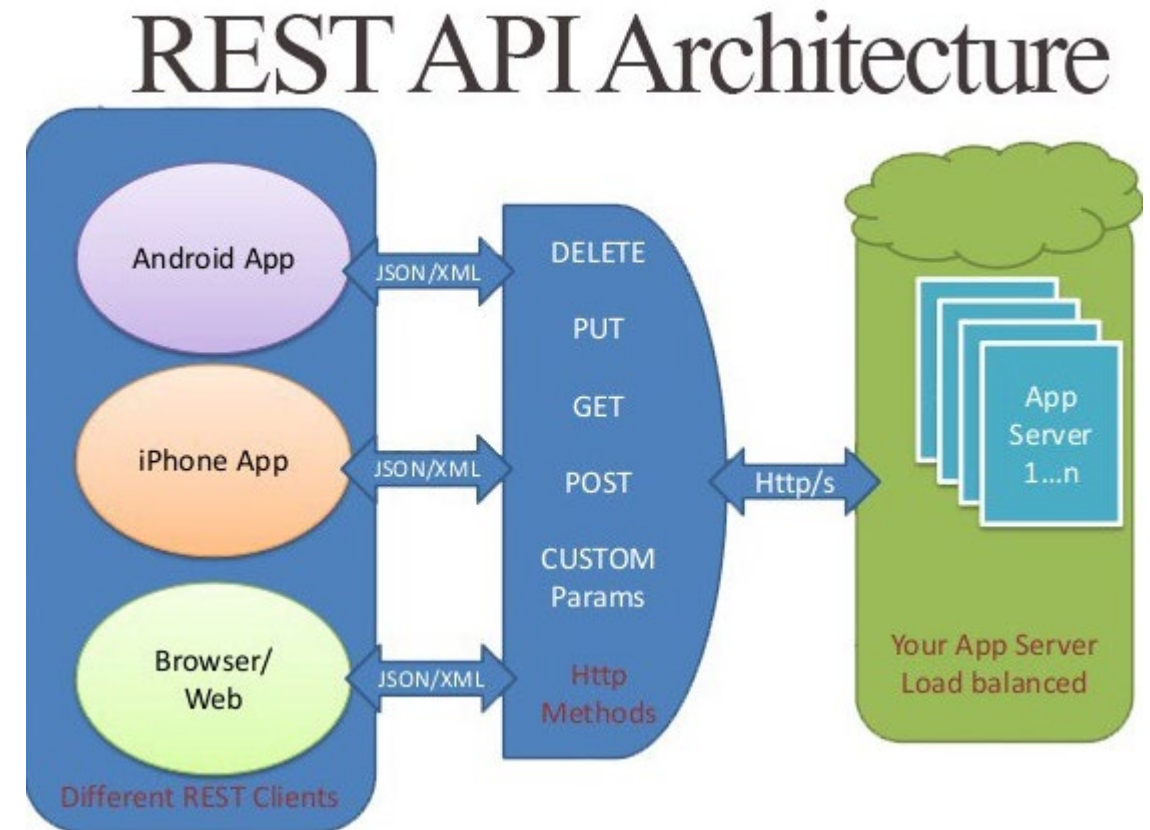
- Many vendors and each have their own app
 - Different terminology
 - Different data fields
 - Different data formats
 - Different reports
- How many apps will my inspector need to install?
- LADOTD is evaluating a HTTP POST API such that vendors will be required to send data in a specified format
 - Allows LADOTD to pipeline the data to a single interface on the inspectors iPad

Data Aggregator Solution



Data Management

- Application Programming Interface
- API data exchange allows data to be transferred electronically
 - Eliminates human error transferring data between mediums
 - Allows for all data fields and formats to be preserved
 - Searchable data
 - Comparable data for triggering notifications
 - Summarized reporting
 - Long term data mining (machine learning)



Data Management- Challenges

- Preserving data keys between applications

Custom Name	Mix Design ID
31102111 (2006) (GCP)	05060-0027
31102111 (GCP)	05060-0021
31102111 (IL)	05900-0038
38202711 (GCP)	05060-0024
38202711 (GCP) (2006)	05900-0004
40152211 (2006) (GCP)	05060-0026
76502511 (GCP)	05060-0023
76502511 (IL)	05900-0034
77202411 (GCP)	05060-0020
77202411 (IL)	05900-0037
77502511 (GCP)	05060-0022
77502511 (GCP)(Mass)	05060-0029
77502511 (IL)	05900-0033
77502511 (Mass) (IL)	05900-0032

Custom Name **77502511 (IL)**
 Mix Design ID **05900-0033**
 Approved Districts **61**
 Approved Contracts **H.001234.6, H.013897.6**
 Specification **2016**
 Type **PCC Structural**
 Material Code **0901M00350 - PCC Structural Class A1**
 Mixing Method **Truck mixer**

Products *
77502511 / 2016 DOTD

Project
1432 / COLLEGE DR. DESIGN BUILD

BATCH CERTIFICATION FOR PORTLAND CEMENT CONCRETE

Plant Data		
Project No: H.013897.6	Time Batched: 6:07 AM / PM	Date: 11-23-2022
Plant Name: [REDACTED]	Batch No: 1	PCC Mix Des. No: 0033
Location: [REDACTED]	Batch Size: 5 yd ³	Concrete (Class/Type): A1
Truck No: 2001	Legal Load: _____ lb / _____ yd ³	Ambient Air Temp: _____ °F

Data Management

Asphalt Production

Contracts | **H.001234.6** | LA 1: PORT ALLEN CANAL BR REPL (PH1)(HBI) | H.001234.6 | Filter

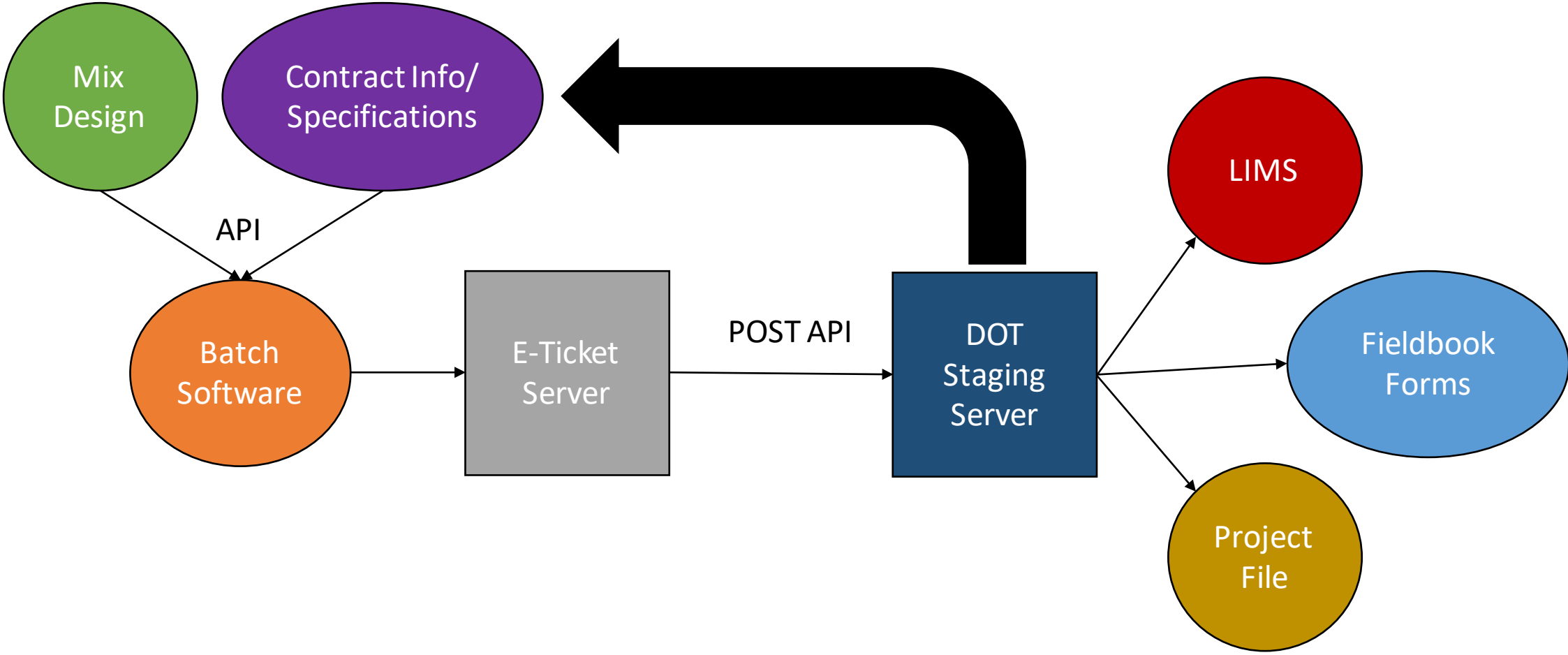
Add New

All Approved Mix Design Report | Mix Design by Lot Report | All Plant Reports | All Roadway Reports | All Pay Reports

Del	Lot	Plant Tons	Mix Design	No of Sub lots	Start Date	
	055001	750	██████ Level 1 Binder PG70-22 10152	00860-0055v0	2	10/20/2022
	056001	385	██████ Wearing Level 1/PAC30/20 Rap --Update - 1	00860-0056v0	1	10/25/2022

Mix ID	DOT Mix Design #	Project Name	Project Number	Date	Ticket Number	Gross Tons	Tare Tons	Net Tons	Running Daily Total	Truck Number
-	LOT 055-001	LA1 ██████ Asphalt	3148	Nov 03, 2022	100300	36.97	14.04	22.93	43.58	QA04
-	LOT 055-001	LA1 ██████ Asphalt	3148	Nov 03, 2022	100301	37.06	15.3	21.76	65.34	QA01
-	LOT 055-001	LA1 ██████ Asphalt	3148	Nov 03, 2022	100303	33.03	14.43	18.6	83.94	ASC02

Data Management



Data Management- Challenges

- Preserving calculations between applications

Design	W/C Ratio by Weight	0.45	0.45 Max	Batch Size = 5cuyd
	Water	28.7 gal	* 5cuyd = 143.5 gal	Batch Water 91.43 gal + Aggregate Moisture 43.77 gal = 135.2 gal
	Cement	267 lb		
	Slag	267 lb		

$143.5 - 135.2 = 8.3$ gal maximum allowable water to add

Actual W/C Ratio
0.453

Max Water to Add
15.8 GA

To Add: 9.8 gal

Maximum Water that can be Added at Jobsite	34 gal
--	--------

Data Management- Challenges

- Preserving data formats between applications
 - Data validation or input validation
 - Data validation is generally easier to process on the user input interface
 - One of these is not like the other:

Input	VALUE(text)
3 inches	▶ #VALUE!
3"	▶ #VALUE!
3	3
3in.	▶ #VALUE!

Demonstration Projects

- **N.S. ELECTRONIC TICKETING SYSTEM (STRUCTURAL CONCRETE) (07-21)**
- **1.0 DESCRIPTION.**
- An electronic ticket delivery system shall be used, in addition to printed tickets, to report the quantities of material that went into each batch of concrete. This system shall be fully integrated with the load readout system at the plant. The electronic ticket shall record and display the same information that is currently required on a printed ticket. Access shall be granted to the Department via a mobile device application compatible with iOS and a browser-based website.
- Each electronic batch ticket shall include the date, time, ticket number, project number, DOTD mix design number, amount of water, batch weights of individual ingredients, moisture content of aggregates, and quantities of admixtures. Additionally, daily summary reports, including all information available on electronic tickets, shall be made available by 12:00 p.m. of the next working day. Provide all ticket information in an exportable CSV format.

Demonstration Projects

- Getting the word out
 - Portal for information review various participating vendors and interested users can sign up
- Notifications to industry associations to spread to membership
- E-Construction newsletter for users with DOT account

It's never been easier to get involved

E-TICKETING HAS ARRIVED IN LOUISIANA

The Louisiana Department of Transportation and Development is moving forward with a state-wide demonstration of an e-ticketing portal with the goal of having several projects in each district participate in the demonstration.

[SIGN ME UP!](#)

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

Demonstration Projects - Challenges

- Creating the change order
 - Plant/Contractor – should we be charging overhead for e-ticketing?
 - Plant – feels like more risk now that the state has a real time data tool when they never really checked the paper tickets
 - Plant/Contractor – what changes for us...sounds like more work...really think we should be charging overhead
- E-ticketing vendors can piggy back off a plants existing batch software
 - Plant - process/workflow does not change at all, just need to update data keys
 - Contractor - process/workflow changes slightly, QC tech now uses app on phone for receiving batch tickets...same process but without paper

Demonstration Projects - Challenges

- Change ordered e-ticketing on project.....what now?
 - LADOTD demonstration projects are for evaluation purposes, e-ticketing is captured in addition to the paper ticket
 - Ensure that everyone understands the paper tickets are still required
 - Review everyone's role
 - Who marks ticket as received/rejected? (QC tech vs inspector)
 - Who is tracking paper vs. e-ticket for demonstration purposes?
 - Each group needs access to e-ticketing vendors app
 - Many have different levels of access for each group that restrict inputs/views
 - Field users need to have the e-ticketing app installed
 - Smart phone
 - Tablet

Demonstration Projects - Challenges

- Interpreting ticket vs. specifications
 - Mix Adjustments: It is permissible to adjust the ratio of fine to coarse aggregates of the approved mix design by no more than 5 percent.
 - Ensure that cementitious materials are within 1 percent of the required weight. For smaller batches of 1 to 3 cubic yards, the quantity of cement and cumulative quantity of cementitious materials shall be neither less than the required amount nor more than 4 percent in excess.
 - Do not change sources of any materials or percentages of cementitious materials, until a new Mix Design form showing the new material or adjusted proportions has been accepted.

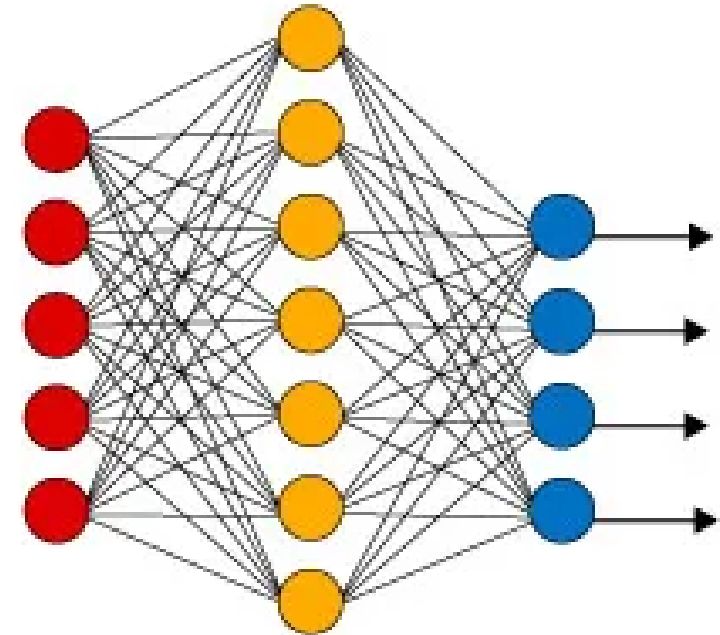
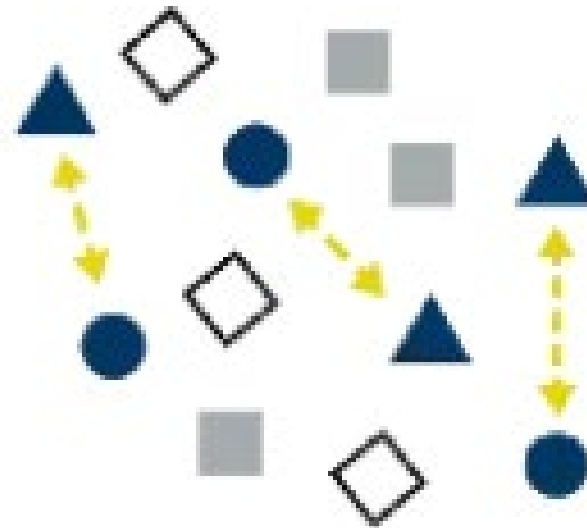
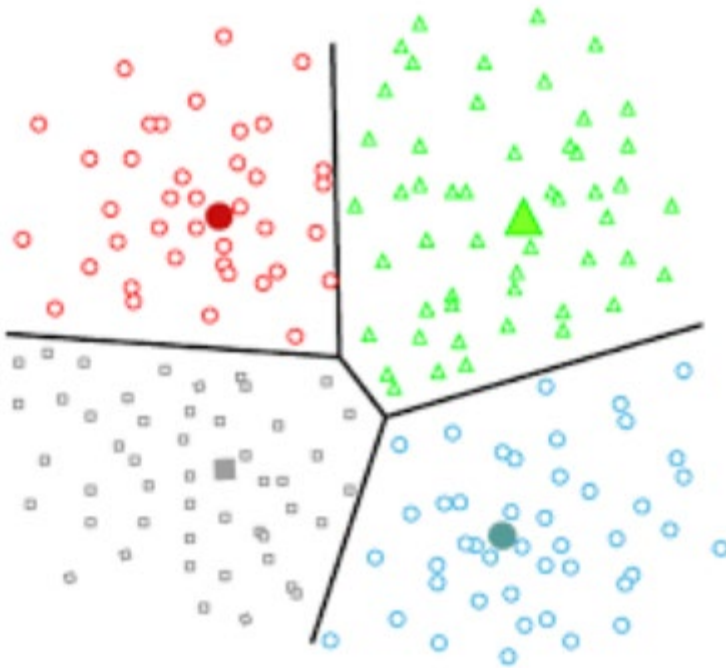
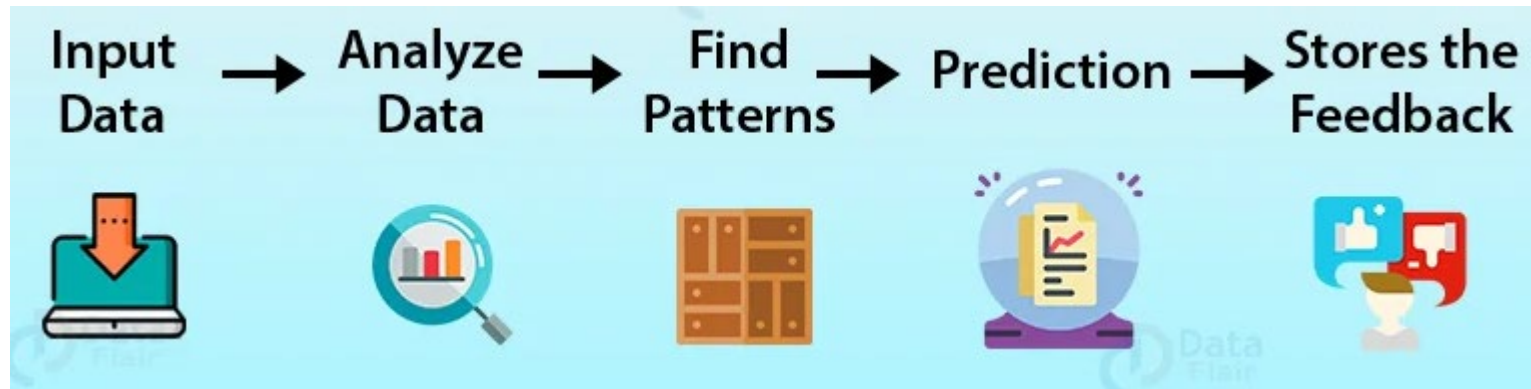
Demonstration Projects - Challenges

- Interpreting ticket vs. specifications
 - Case where a truck was rejected because the cement component was 1.5% over design
 - 50/50 blend with slag, the total cementitious content was only 0.75% over design
 - How to interpret shift in cement:slag ratio if 50% slag was required?
- Ticket vendors interfaces may not be flexible state to state
 - another reason we are looking at capturing the data with an API such that we can display in our own interface for our users.
- DOTD is also realizing how tight these tolerances are and looking to adjust to more reasonable
 - -1% to +4%

Draft Specification

- Method to exchange data: HTTPS POST API
 - Each vendor will be given a unique authentication key
 - Specify timeframe to established new plant/project
 - Ticket data transfer sync time = 5 minute interval
- Data format
 - JSON text
 - Specifying required fields for each material
 - Specifying field names (preferable)
 - Specifying field data types, rounding, and validation requirements (preferable)
- How to enforce?

Future – Machine Learning



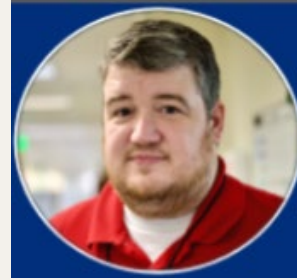
Thank you!



Today's presenters



Matt Miller
matthew.miller@iowadot.us
*Iowa Department of
Transportation*



Patrick Icenogle
patrick.icenogle@LA.gov
*Louisiana Department of
Transportation and Development*



Kathryn Weisner
kathryn.weisner@dot.gov

Thomas Murphy
tjmurphy@nd.gov
*North Dakota Department of
Transportation*



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TRB Webinar: Evaluating the Smoothness of Newly Constructed Concrete Bridge Decks

February 7

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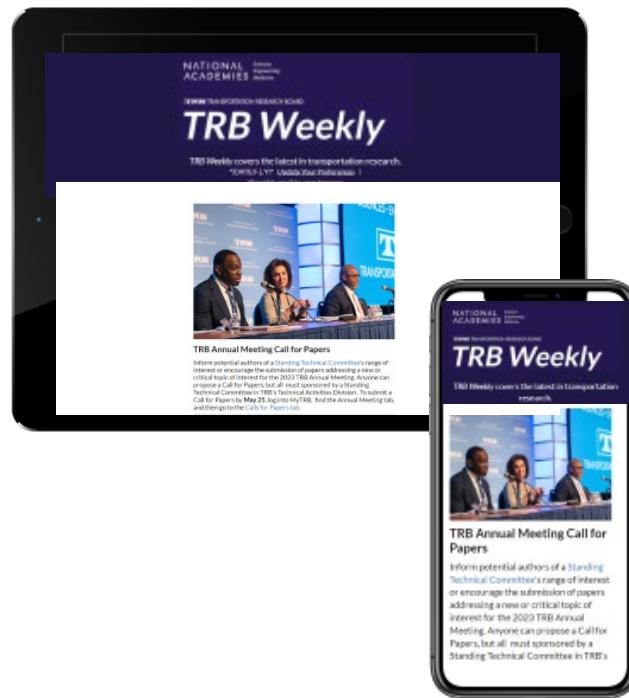
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Get involved

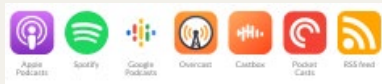
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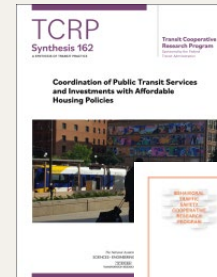
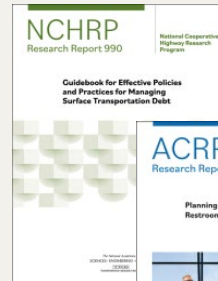
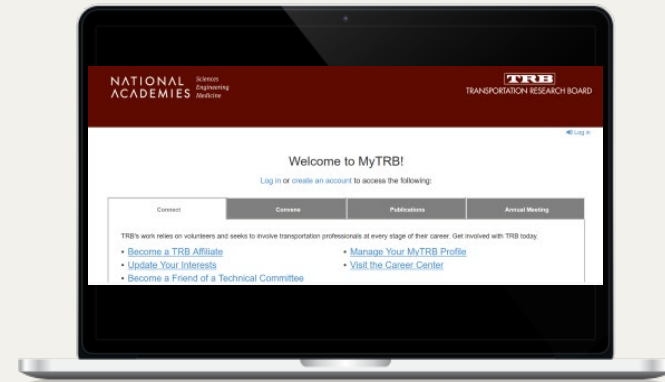
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