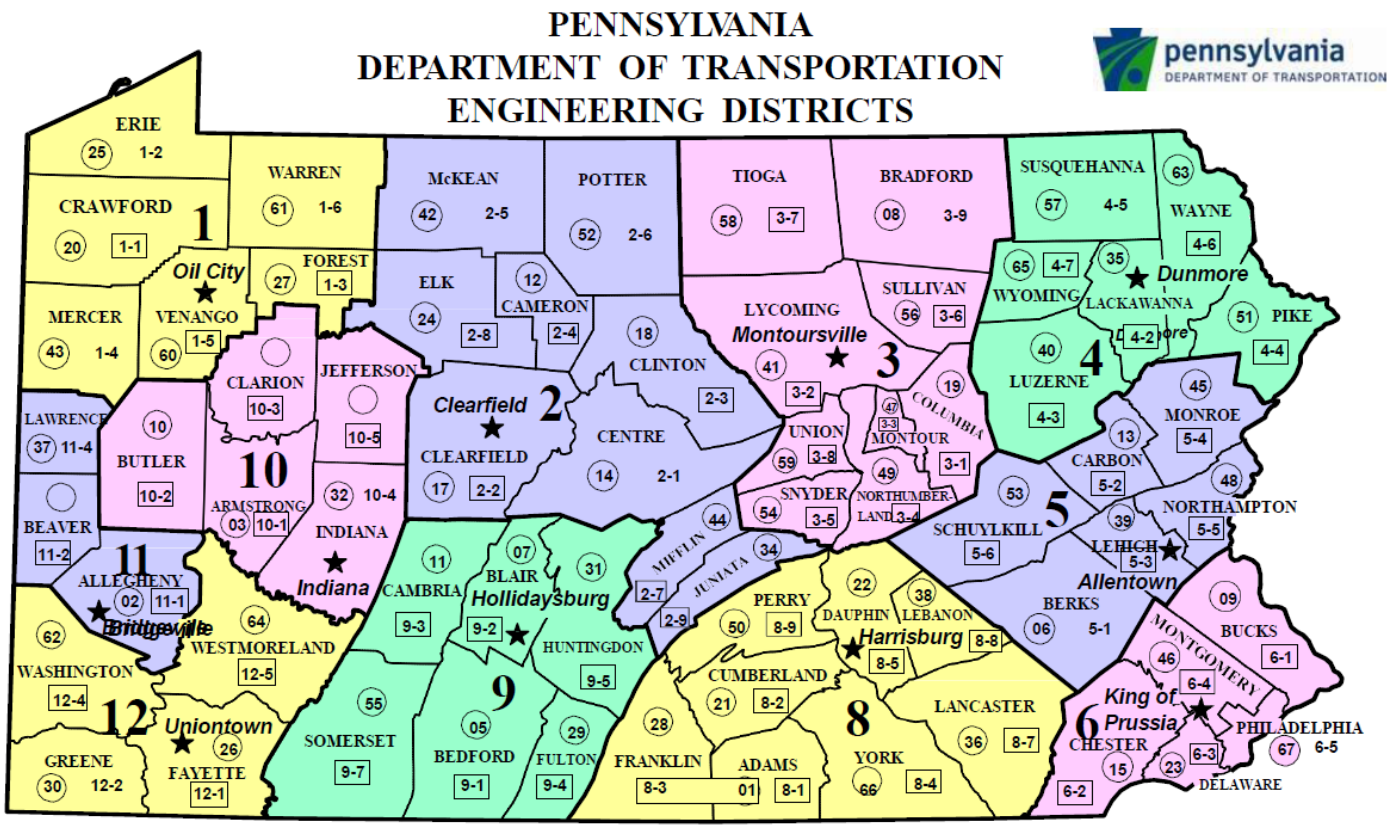
PennDOT e-Construction: Material Quality Assurance

Presenter:
John Myler

PennDOT

Overview of PennDOT

- 11 Districts
- 1162 active projects
- $7.3 Billion program
- 583 Full Time Inspectors
- 131 Local projects $516M



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Construction Projects Involve LOTS of Paper

100 to 5,000 associated documents- multi-page plans, shop drawings, Requests for Information, e-mails, etc.

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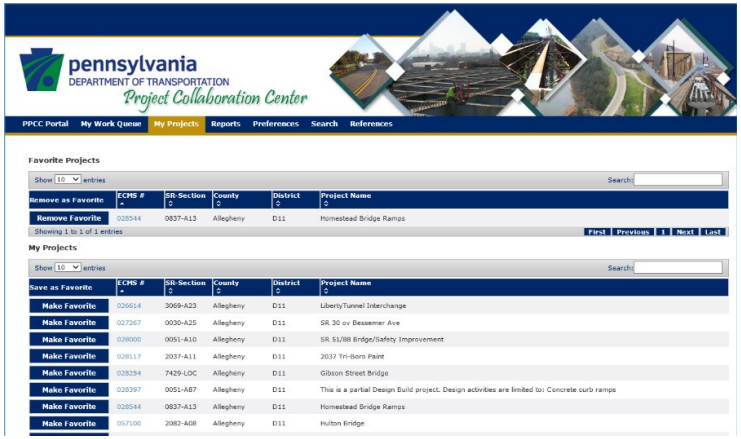
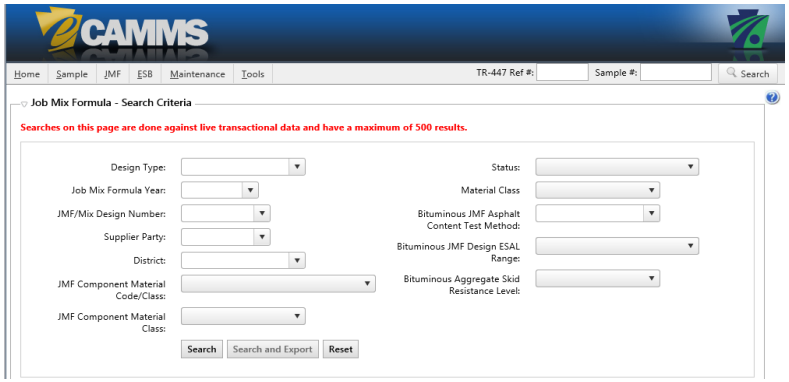
ECMS/CDSv3

PPCC



eCAMMS



Mobile Construction

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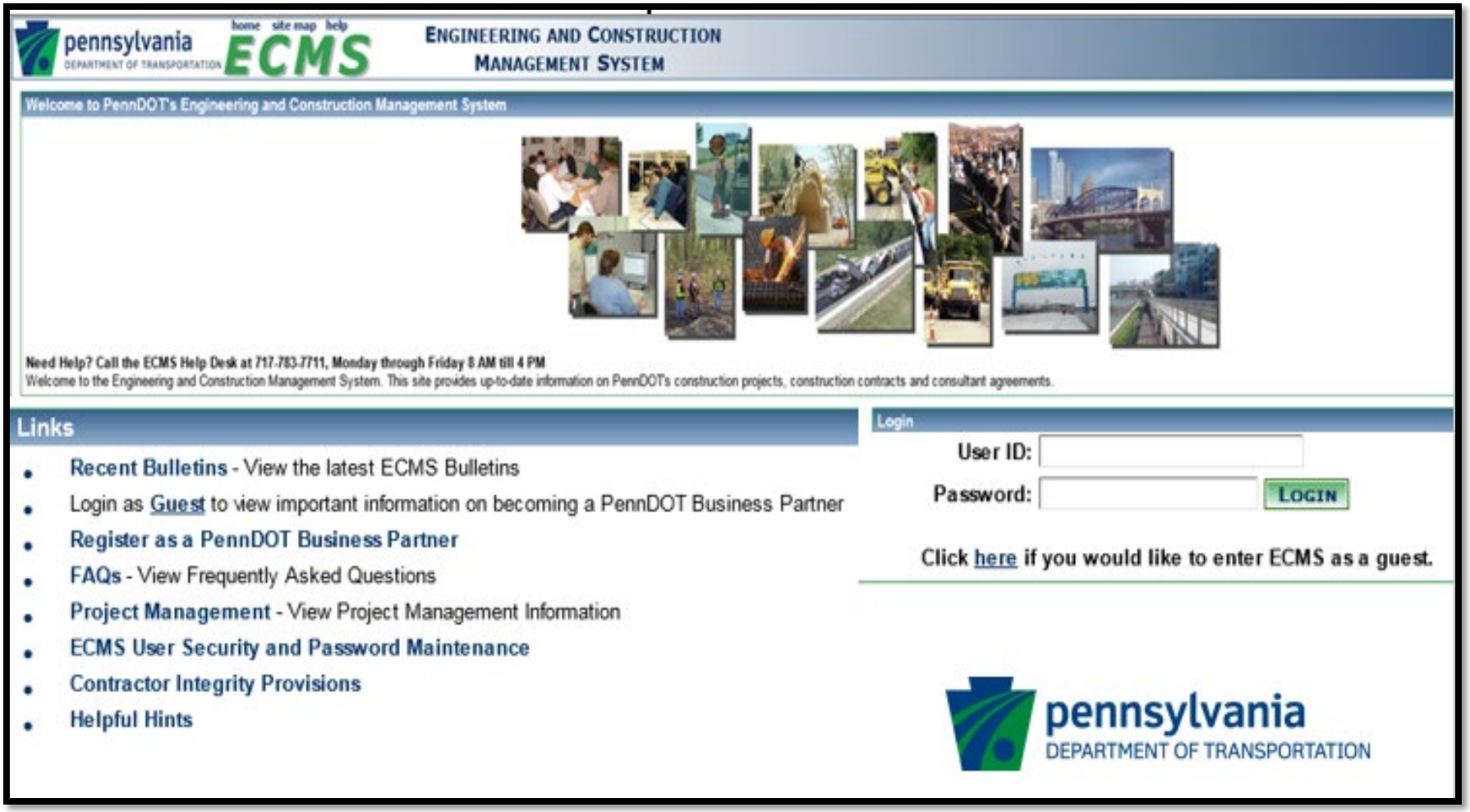
Engineering Construction and Management System (ECMS)

ECMS was initially implemented in 2003



PennDOT's Existing E-Construction

- Engineering and Construction Management System (ECMS)
  - (Material) Source of Supply
  - Project Site Activities (PSAs)
  - Actual Force Accounts
  - Force Account Estimates
  - Report Facility
  - Erosion and Sediment Visual Site Inspection
  - Audits
  - Project Punchlist

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ECMS – Construction Project Menus

Construct

- Addresses
- Subcontractor Requests
- Construction Items
- Source of Supply
- Project Site Activities
- Contract Work Authorizations
- Work Orders
- Estimates
- Actual Force Accounts
- Force Account Estimates
- Adjustments
- Time Extensions/Reductions
- Reassigned (No)
- Report Facility
- Erosion and Sediment Visual Site Inspections

Closeout

- Audits
- Construction Records
- Contractor Evaluations
- Quality Survey for Design Items
- Project Punchlist
- Finalization Checklist
- Acceptance Certificate
- Final Quantities

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PennDOT's Existing E-Construction

- PennDOT Project Collaboration Center (PPCC)
  - Submittals with automated workflow
  - Shared/Project Files/Photos

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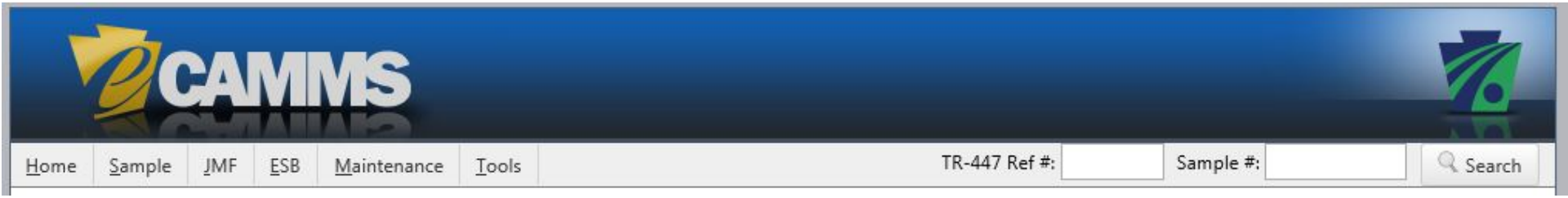
PennDOT's Existing E-Construction



- Electronic Construction And Material Maintenance System (eCAMMS)
  - Material Sampling Testing Data and Reporting
  - Job Mix Formulas
  - Producer Products

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Mobile Construction

iPad Developments

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The goals of PennDOT's Mobile Program:

- Provide tools that increase productivity for our field staff and field consultants
- Transform labor intensive, manual paper processes through efficient mobile technology
  - We are NOT just "digitizing" existing forms
  - Transforming the way business is conducted
- Improve Data Collection and Reporting Capabilities

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- In January 2013, PennDOT implemented our first mobile app
- With every app the business process is re-engineered
  - On-line data transfer to legacy systems
  - Improve data quality
  - Build User-Friendly interfaces
  - Reduce data entry
- Off-line work capability, synchronizing when connectivity is available

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It doesn’t happen overnight !!!

- Introducing APPLE into a Microsoft World
  - Technical Support
  - Resourcing - finding experienced team members
  - Apple User Agreements
- Identify and Recruit Business and Executive Champions
- Managing Senior Executives expectations
- Changing the Existing Culture and Policies
- Training, Training, Training

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MC DOCs

PSA

Punchlist

Force Account

CID

MPT

CMH Mobile

Visual Site Inspection Report

Sample ID

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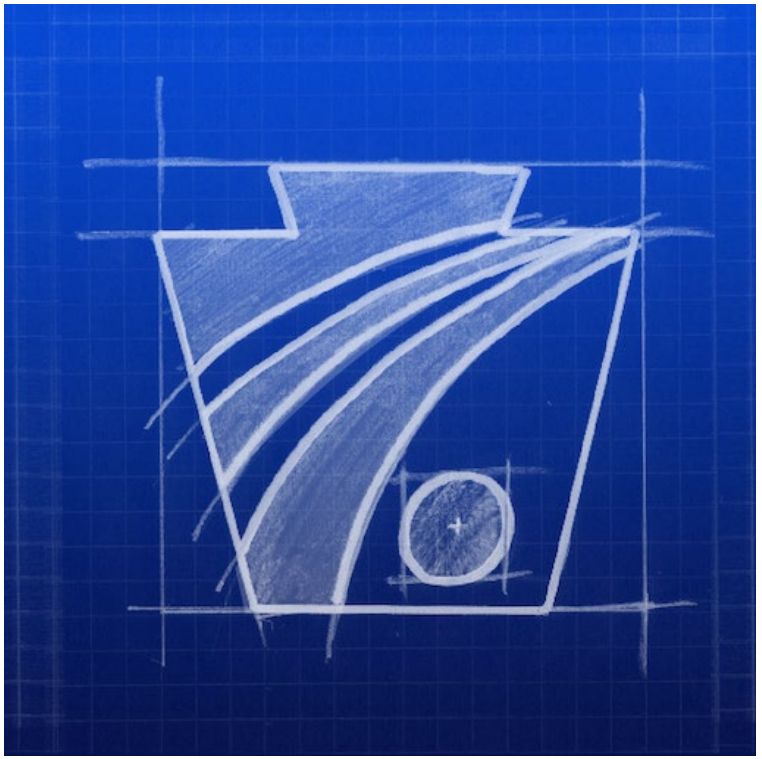
MC Docs 3.0



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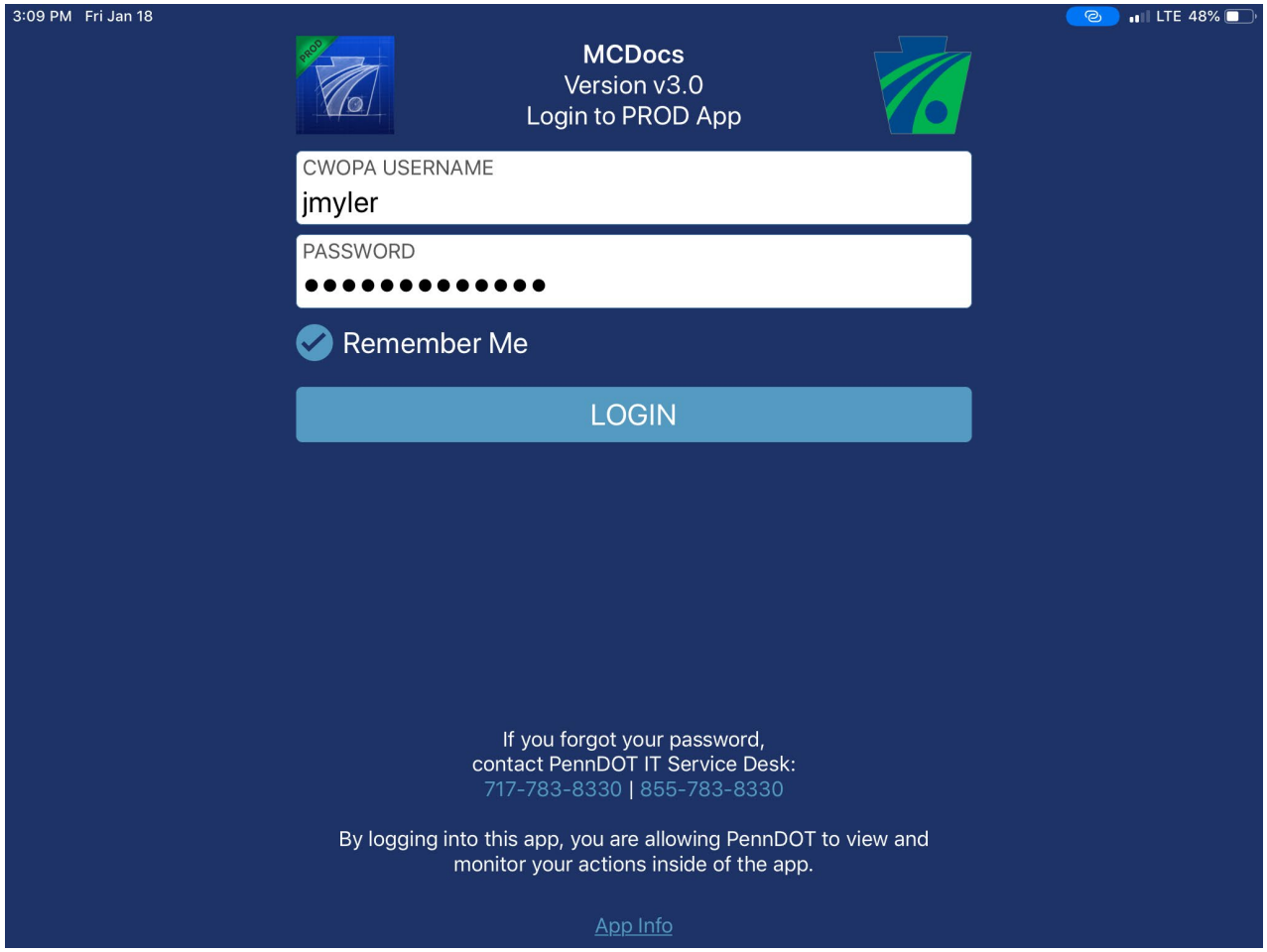

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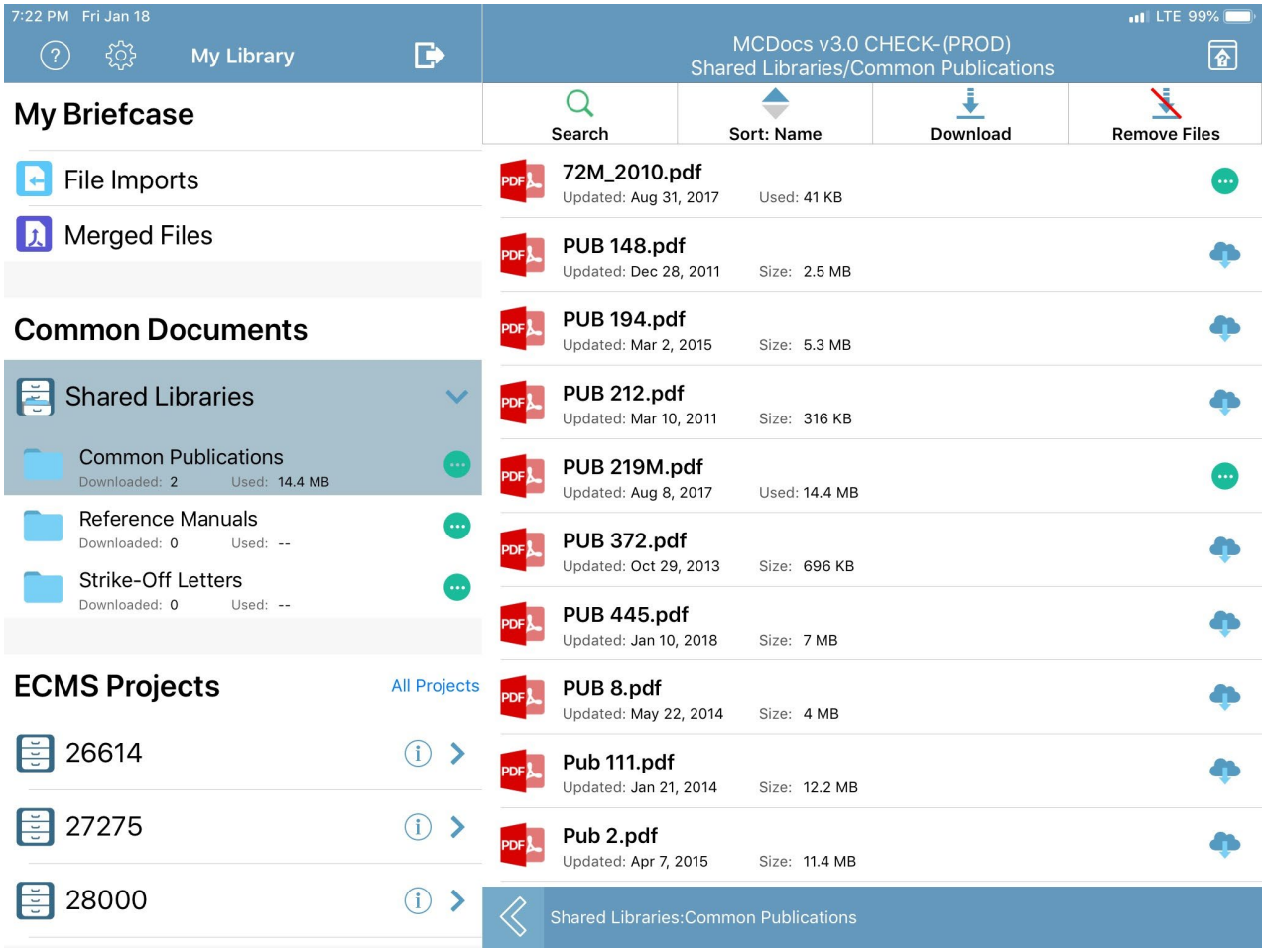

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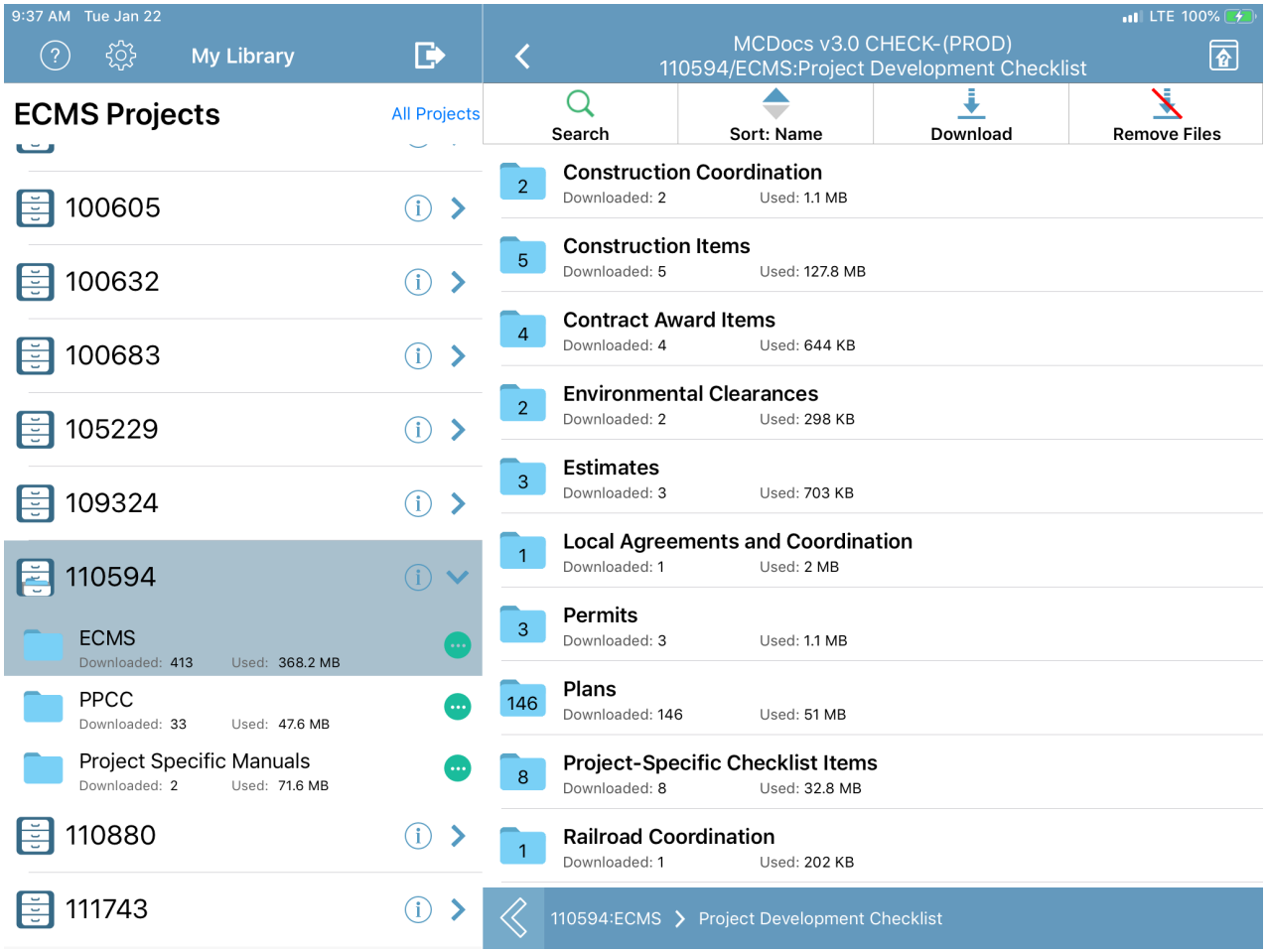

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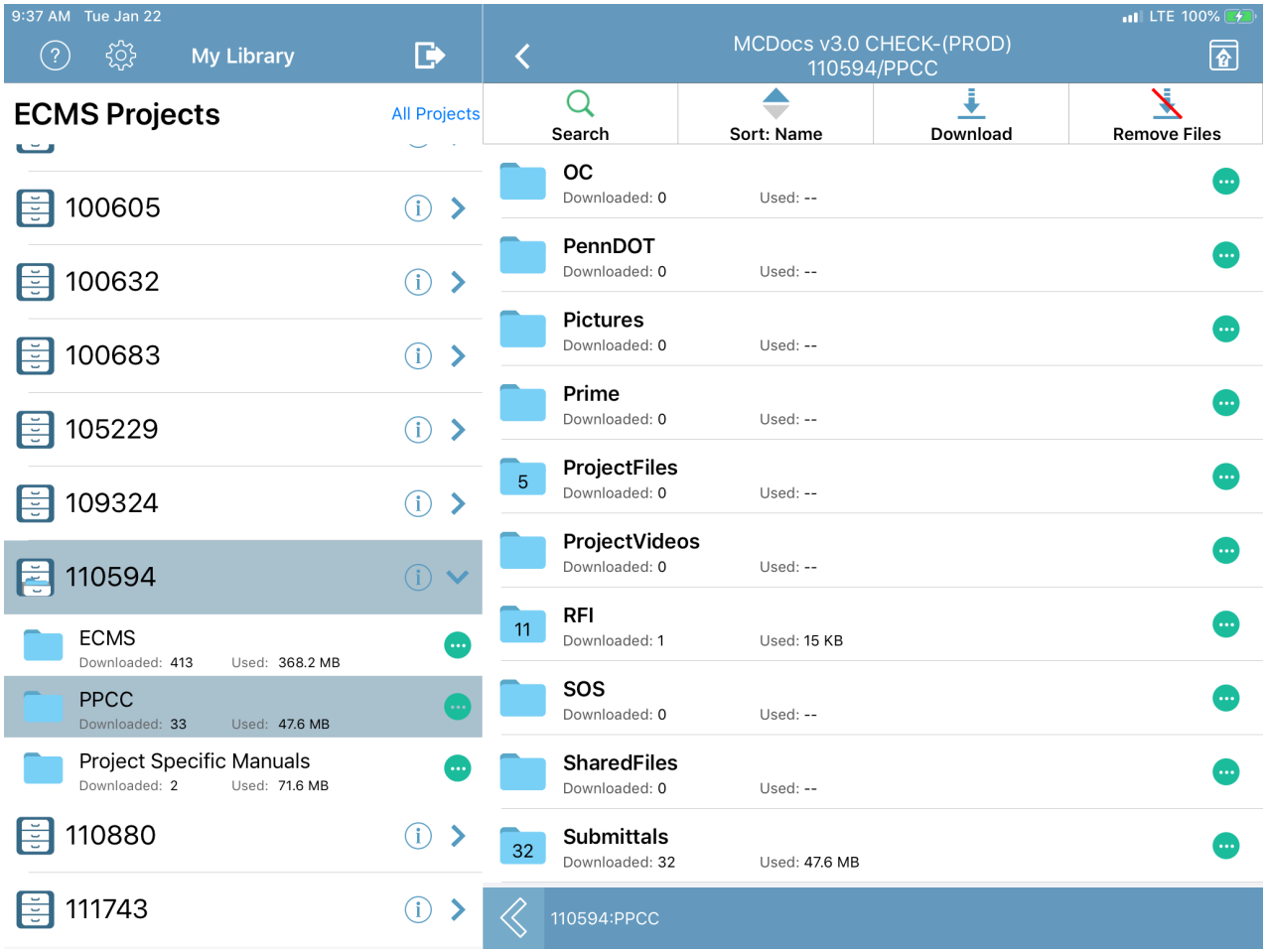

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PSA V4.4

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MC-Force Account V1.3

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Punchlist V1.5

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MC-MPT V1.4

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CMH Mobile

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Visual Site Inspection Report

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Sample ID

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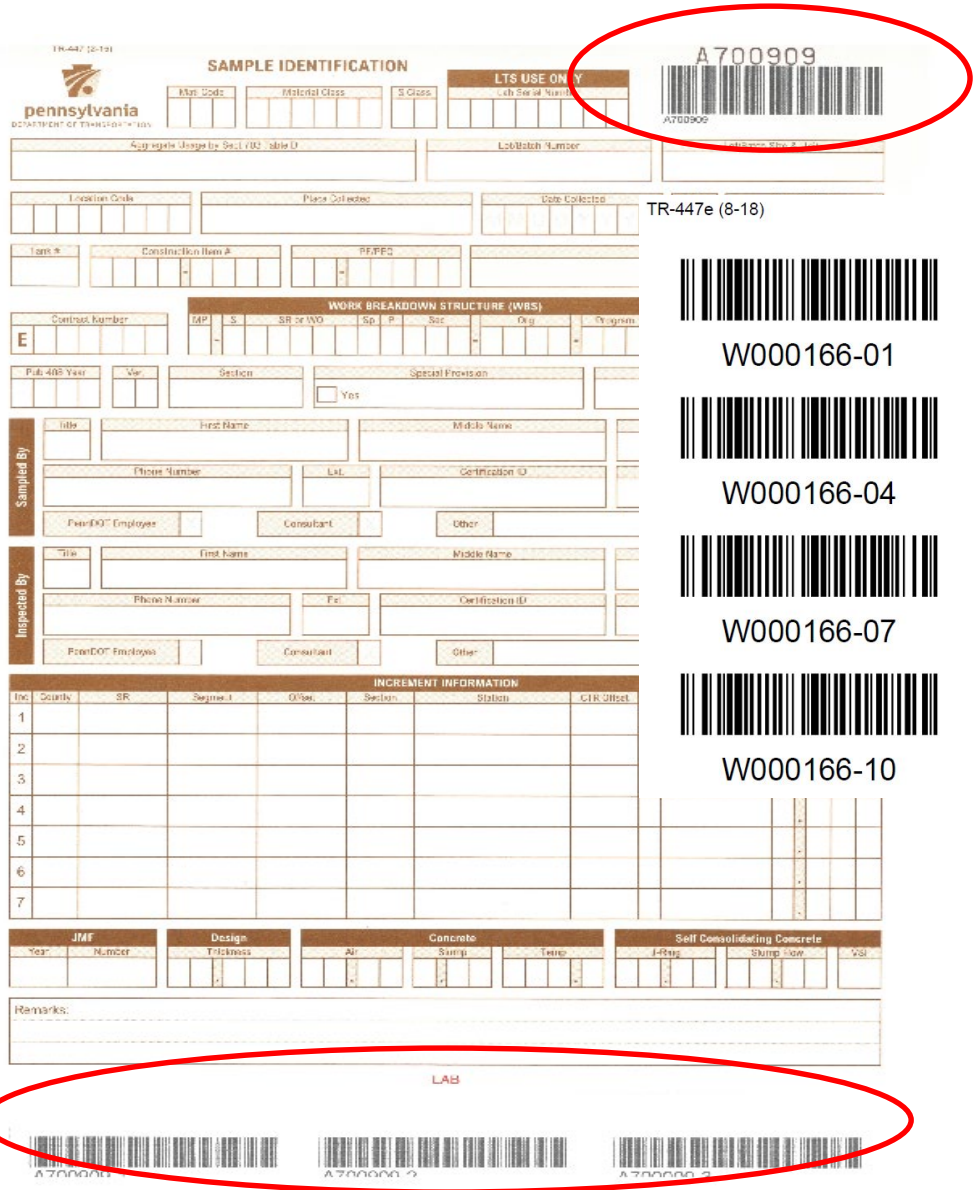

W000166-01 W000166-02 W000166-03

W000166-04 W000166-05 W000166-06

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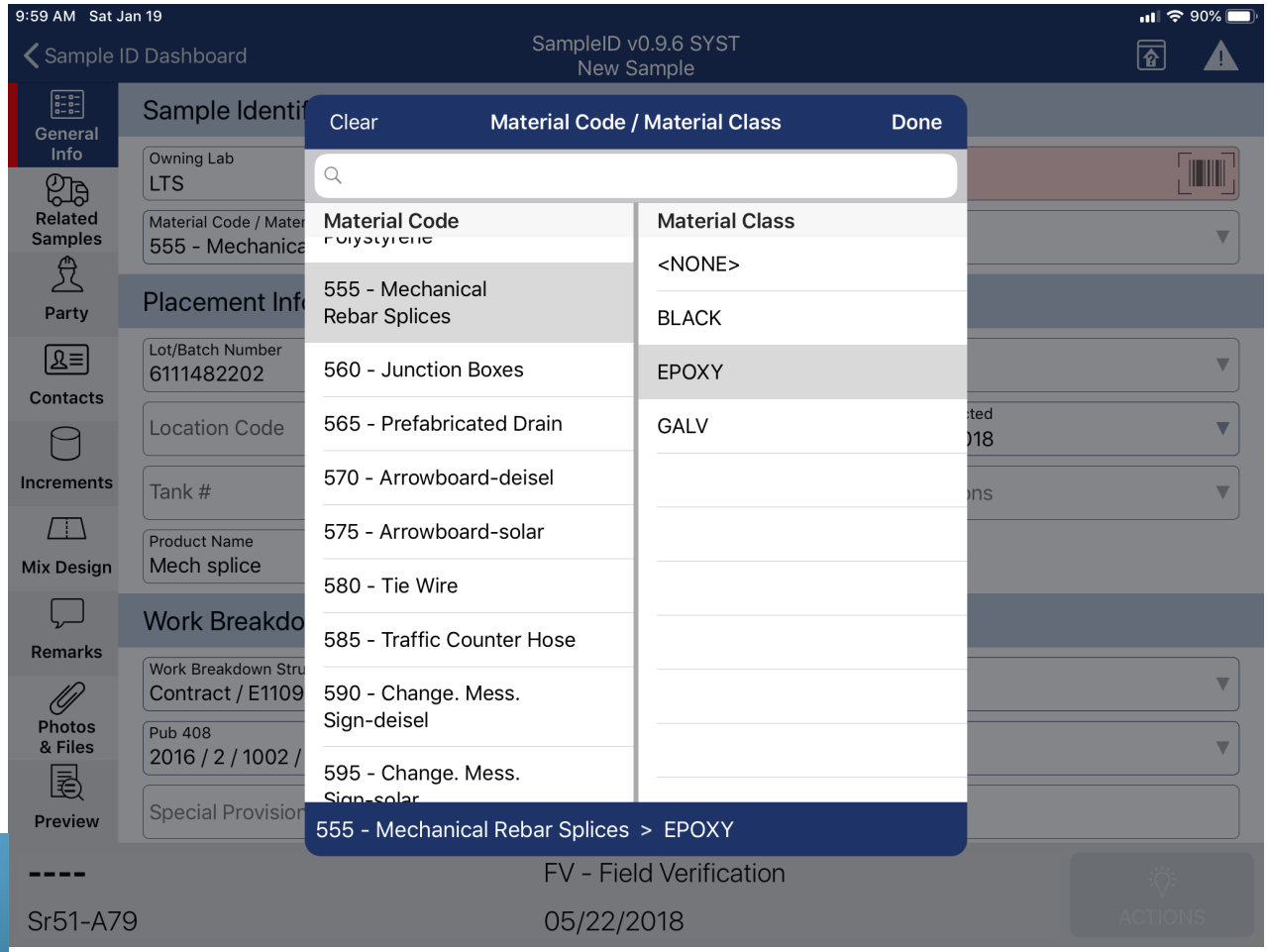

SAMPLE ID

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MC-Concrete Inspection Diary V1.10

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PennDOT e-Construction Initiative

MC-CID

- This application will capture all information pertaining to a concrete placement.
- The inspector will enter the test result data into the app for the concrete placement.
- This information will then continue through the 7 and 28 day cylinder breaks.
- Data can then be sync'd with the Electronic Construction and Materials Management System (eCAMMS) for data retention and future analysis or reporting.
- Ability to generate reports on countless parameters like comparing concrete strengths, slump or air content against the original mix design. Also allow for regional data comparison by supplier or specific mix design.

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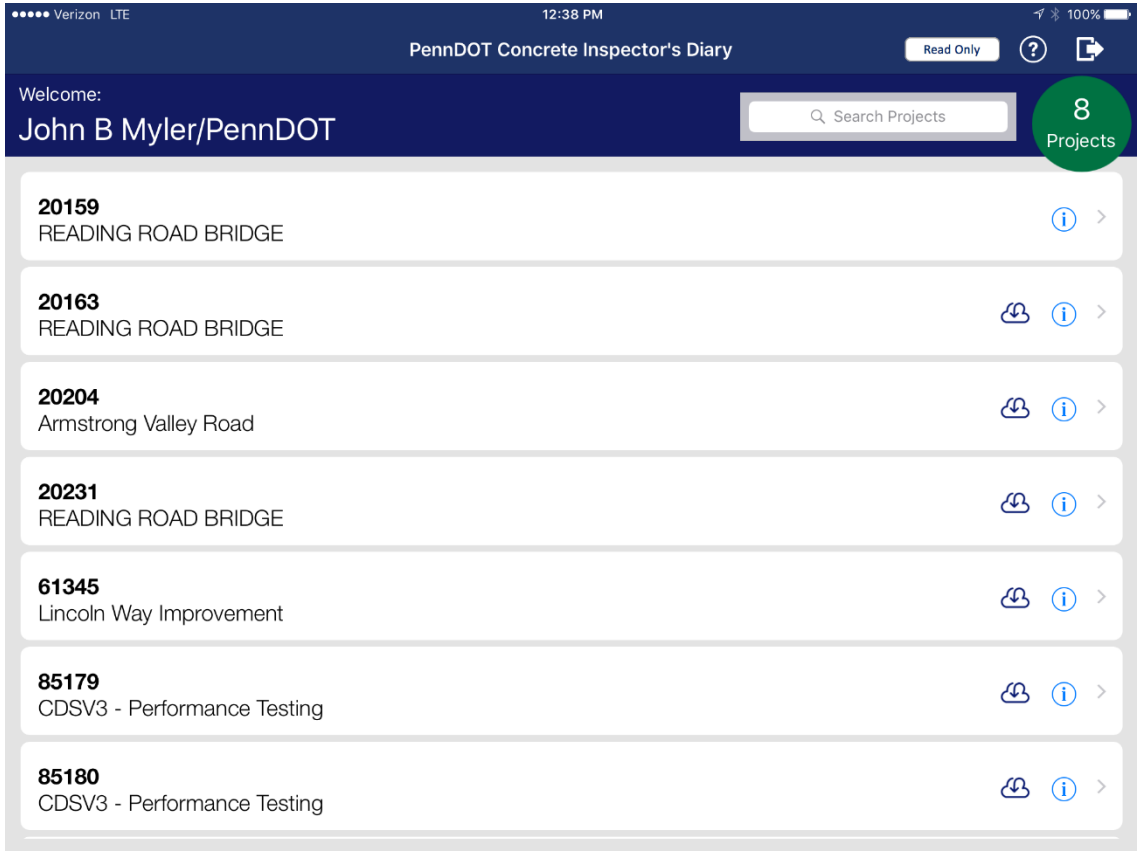

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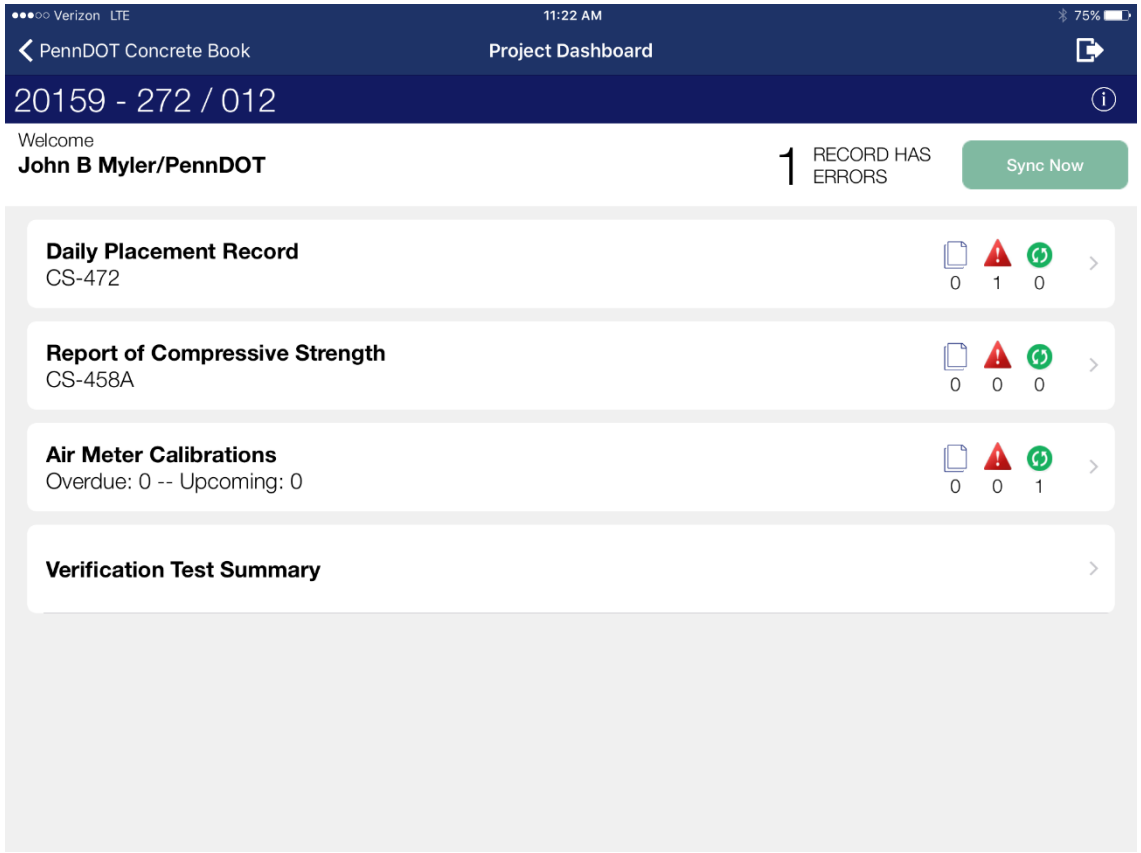

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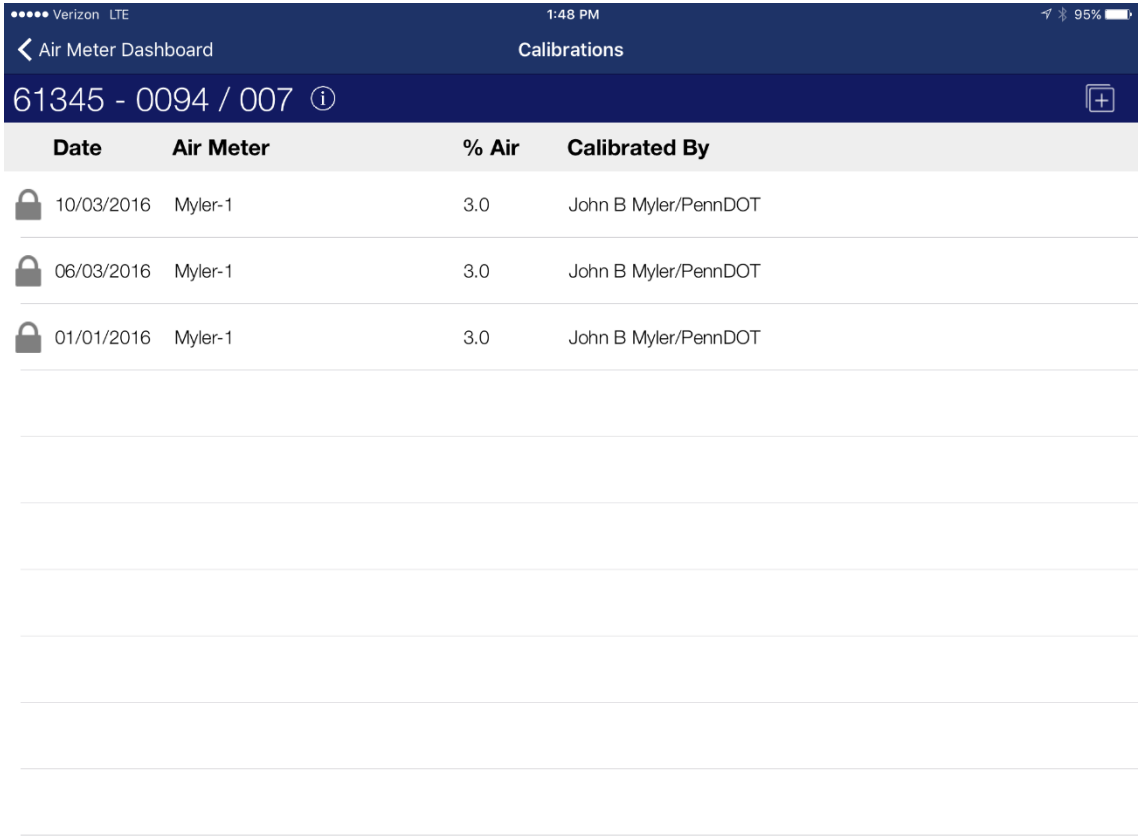

Date	Air Meter	% Air	Calibrated By
10/03/2016	Myler-1	3.0	John B Myler/PennDOT
06/03/2016	Myler-1	3.0	John B Myler/PennDOT
01/01/2016	Myler-1	3.0	John B Myler/PennDOT

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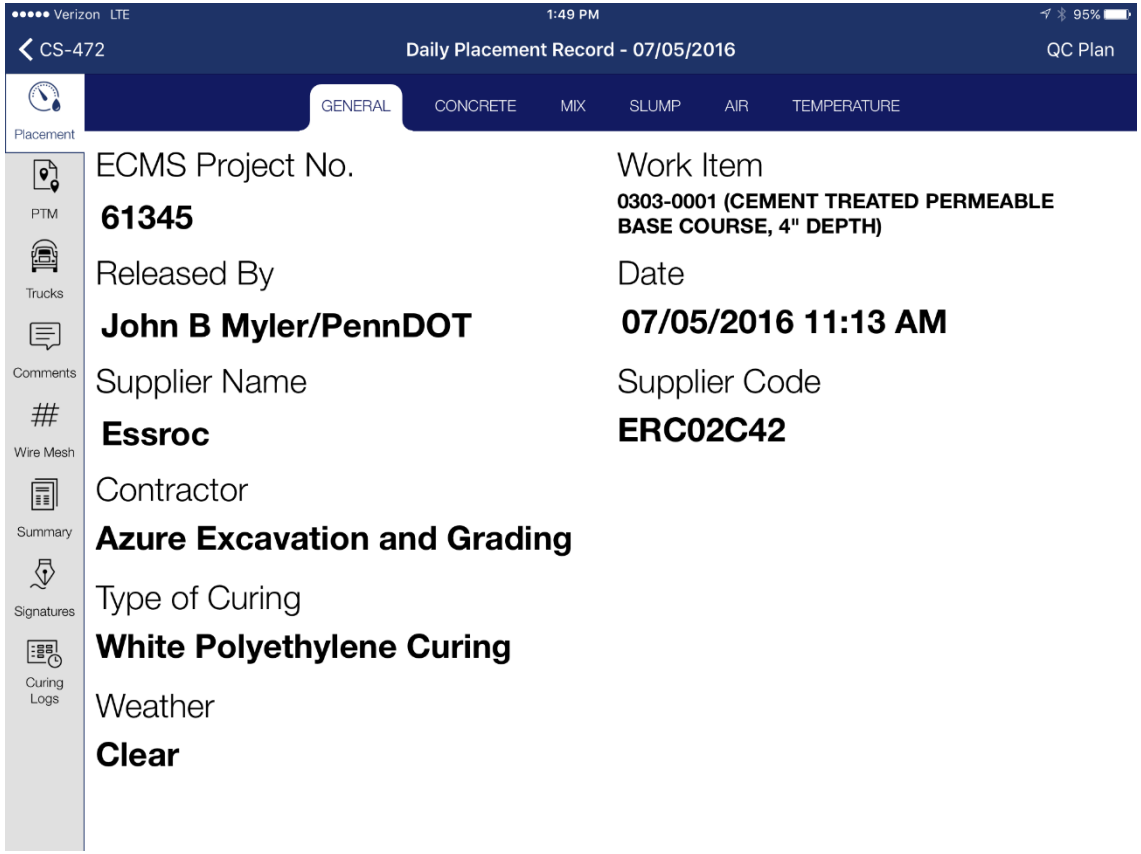

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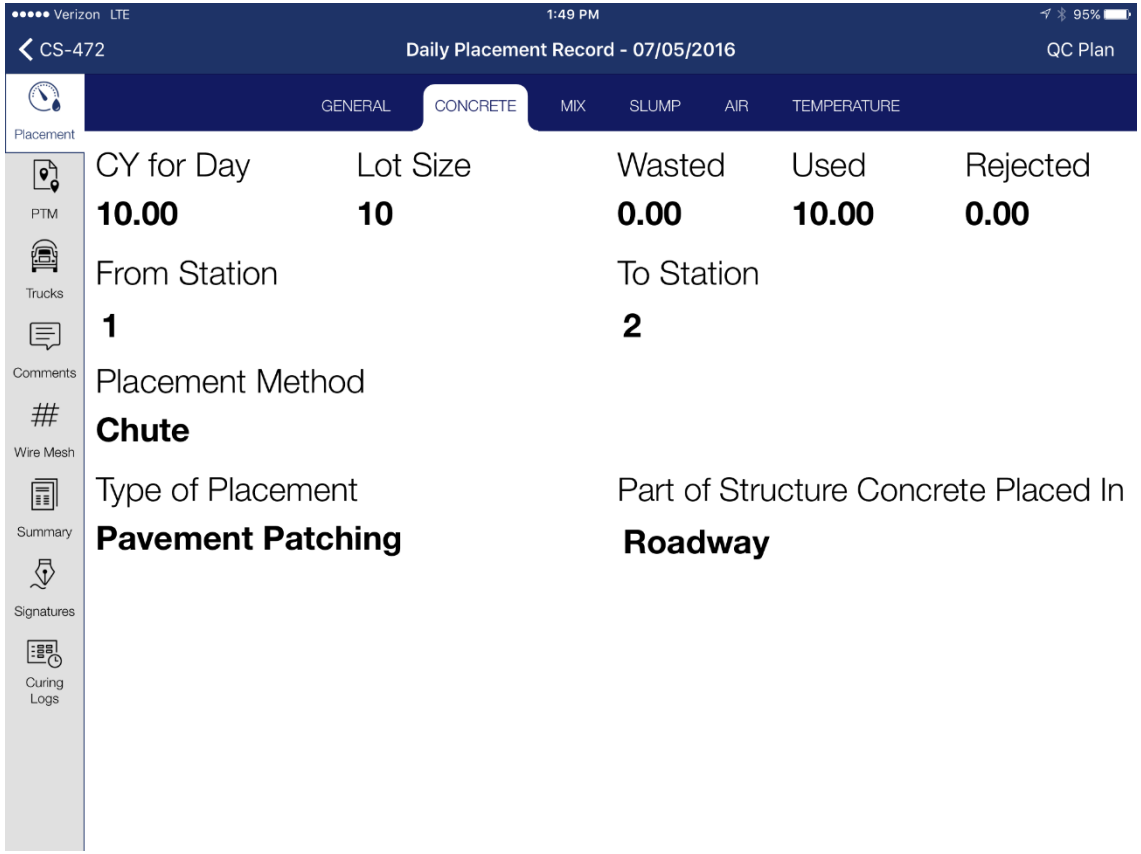

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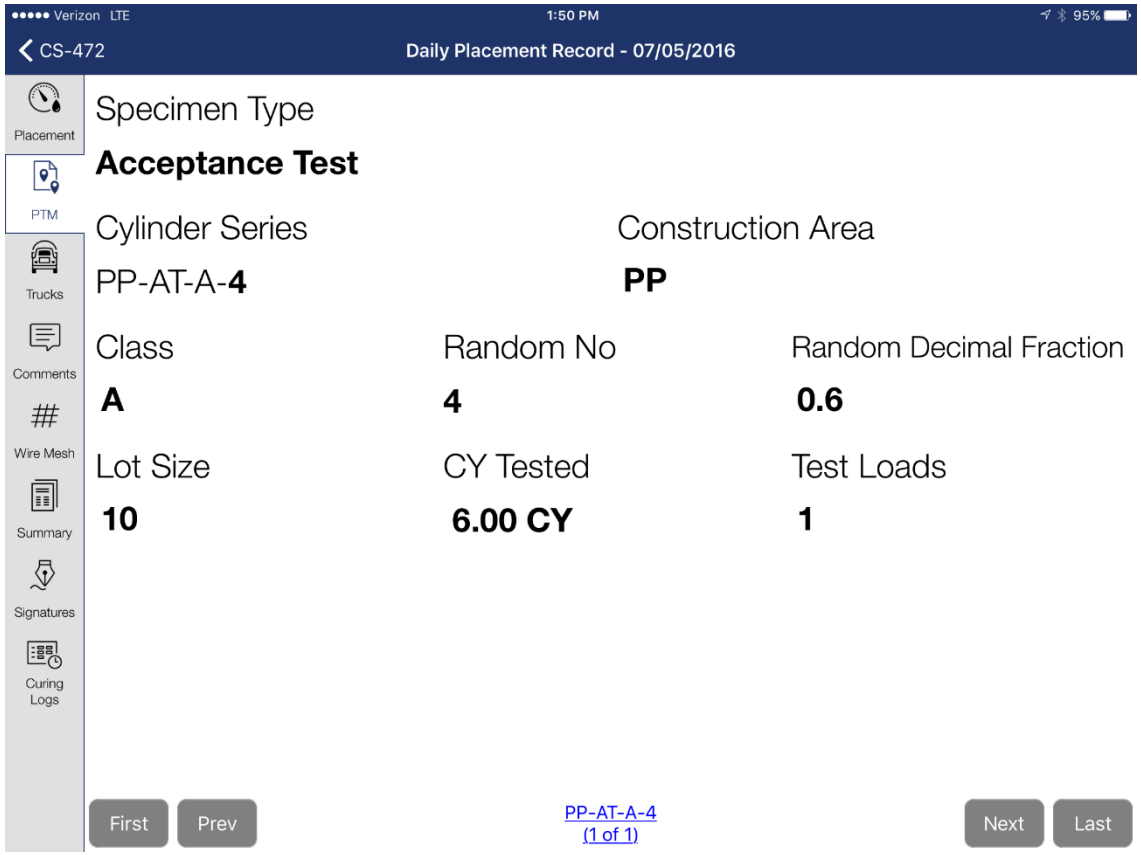

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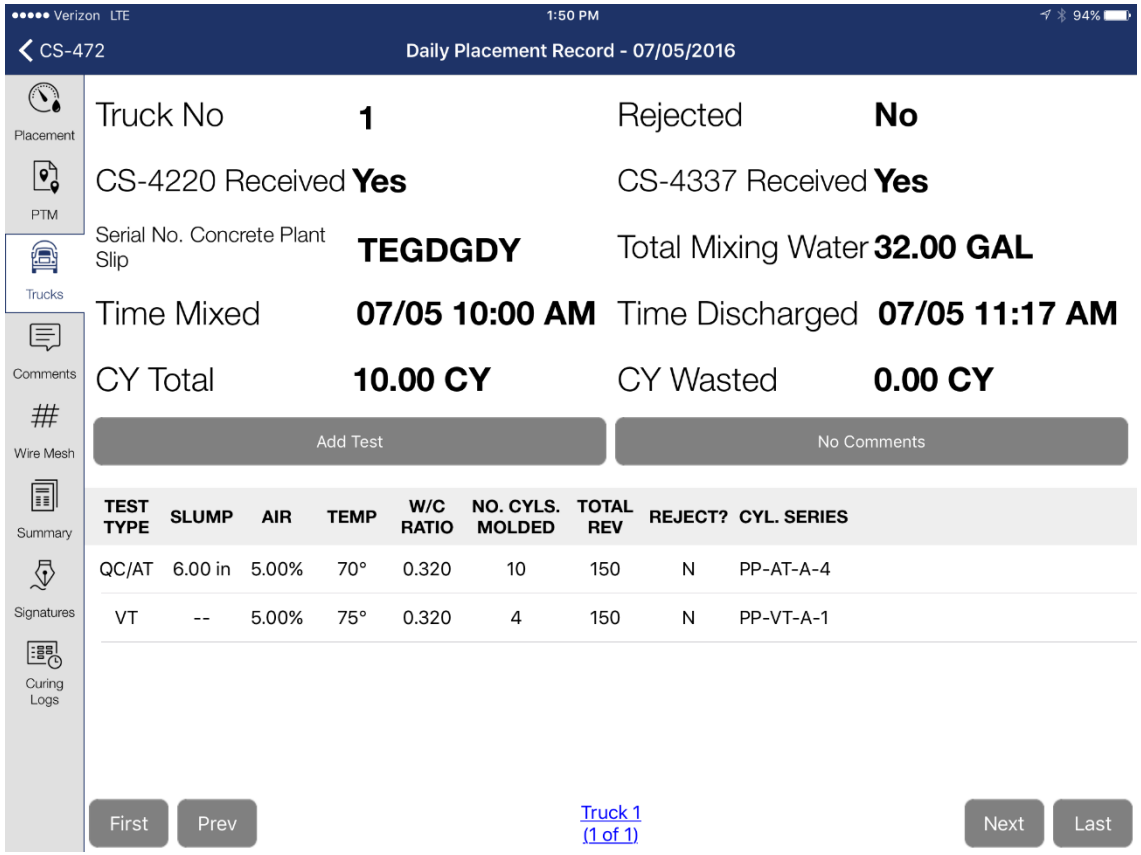

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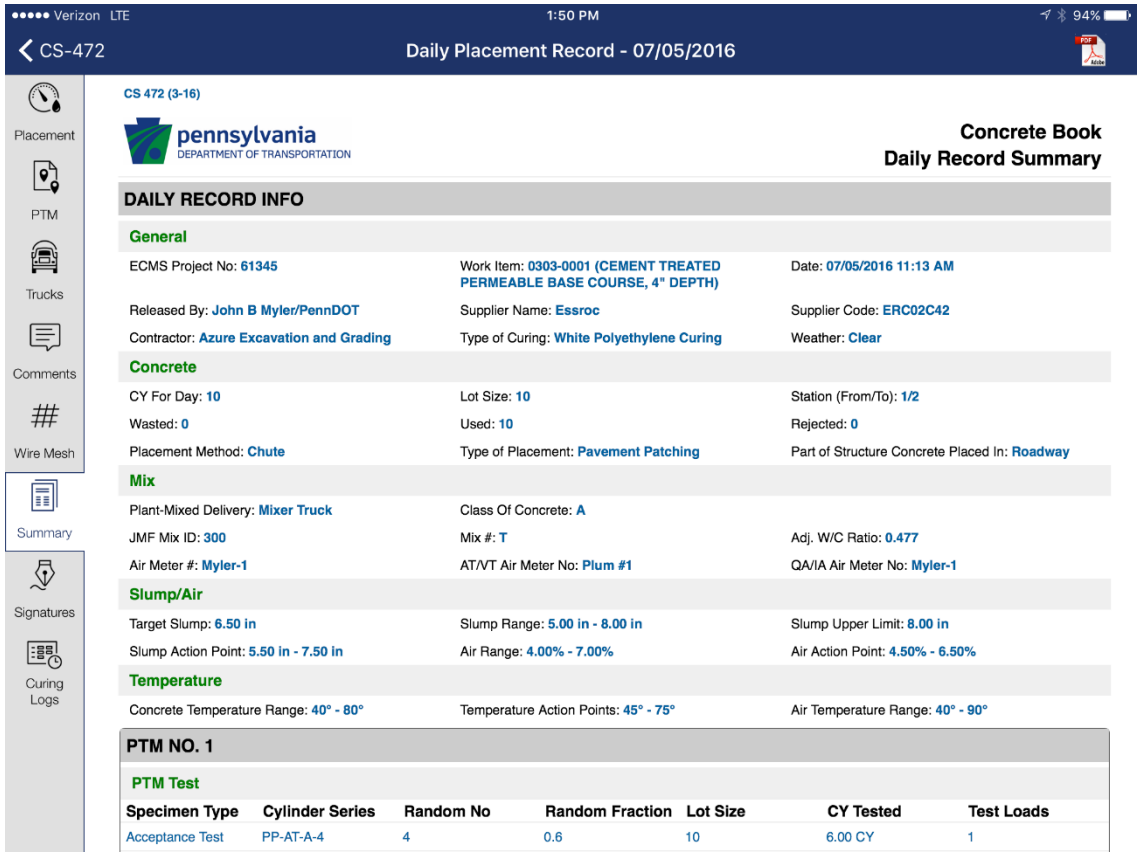

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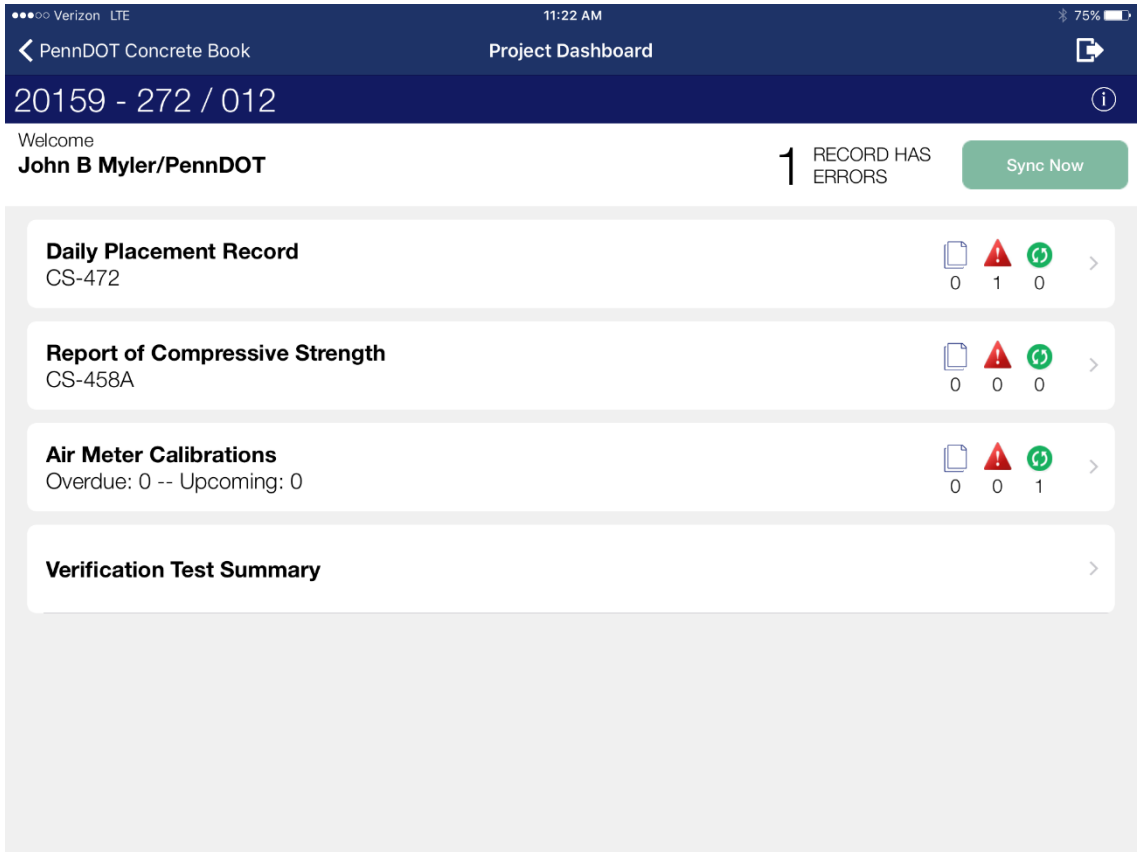

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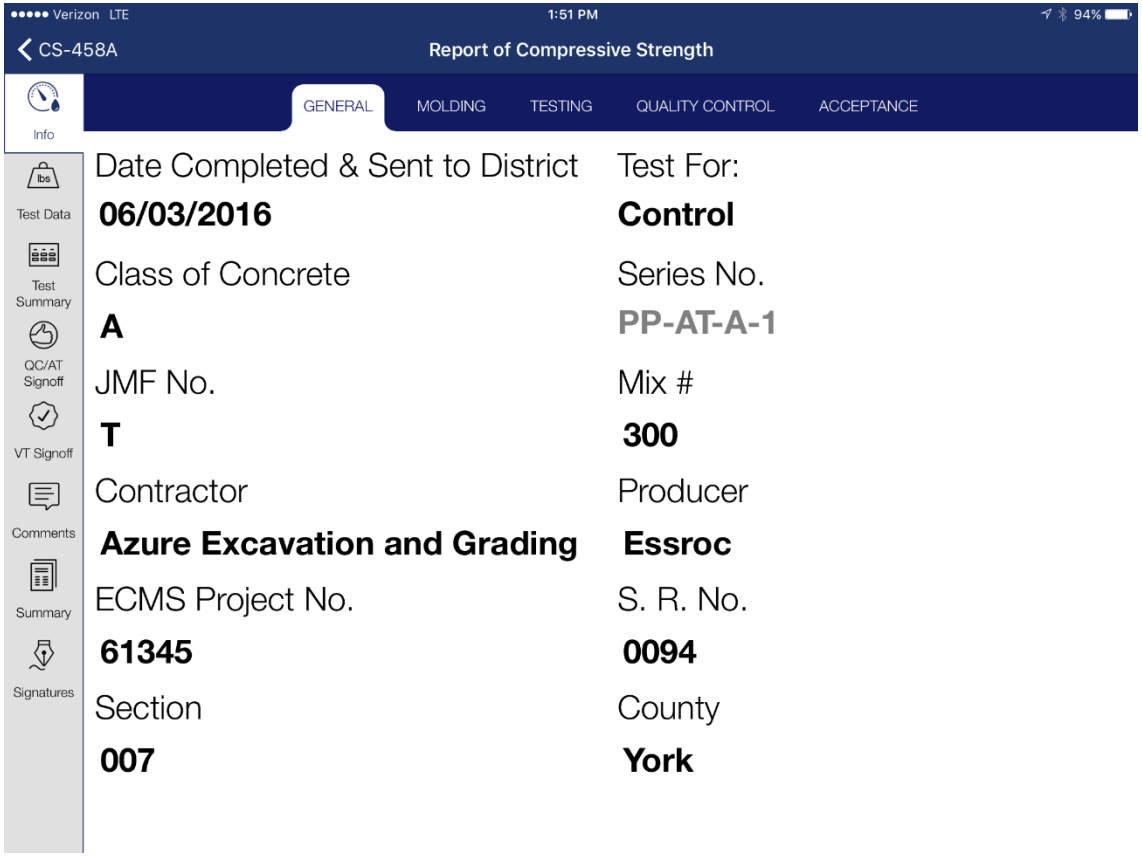

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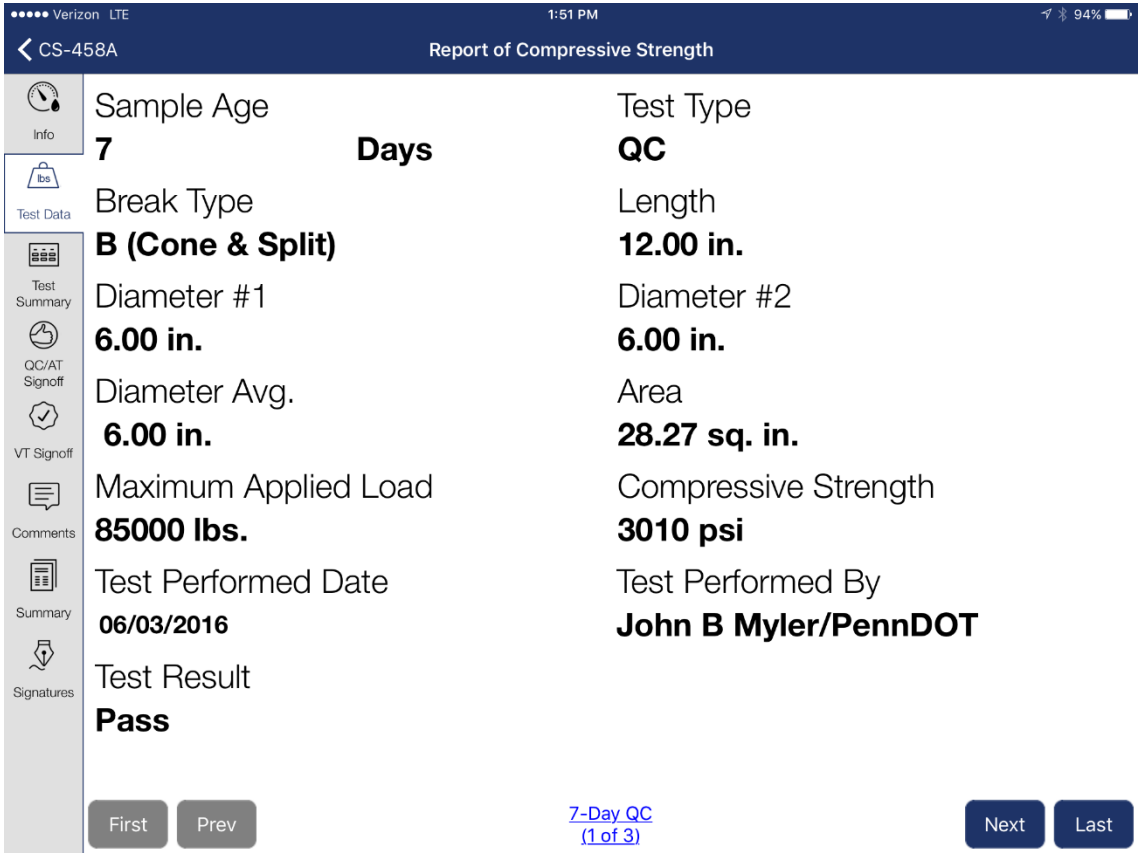

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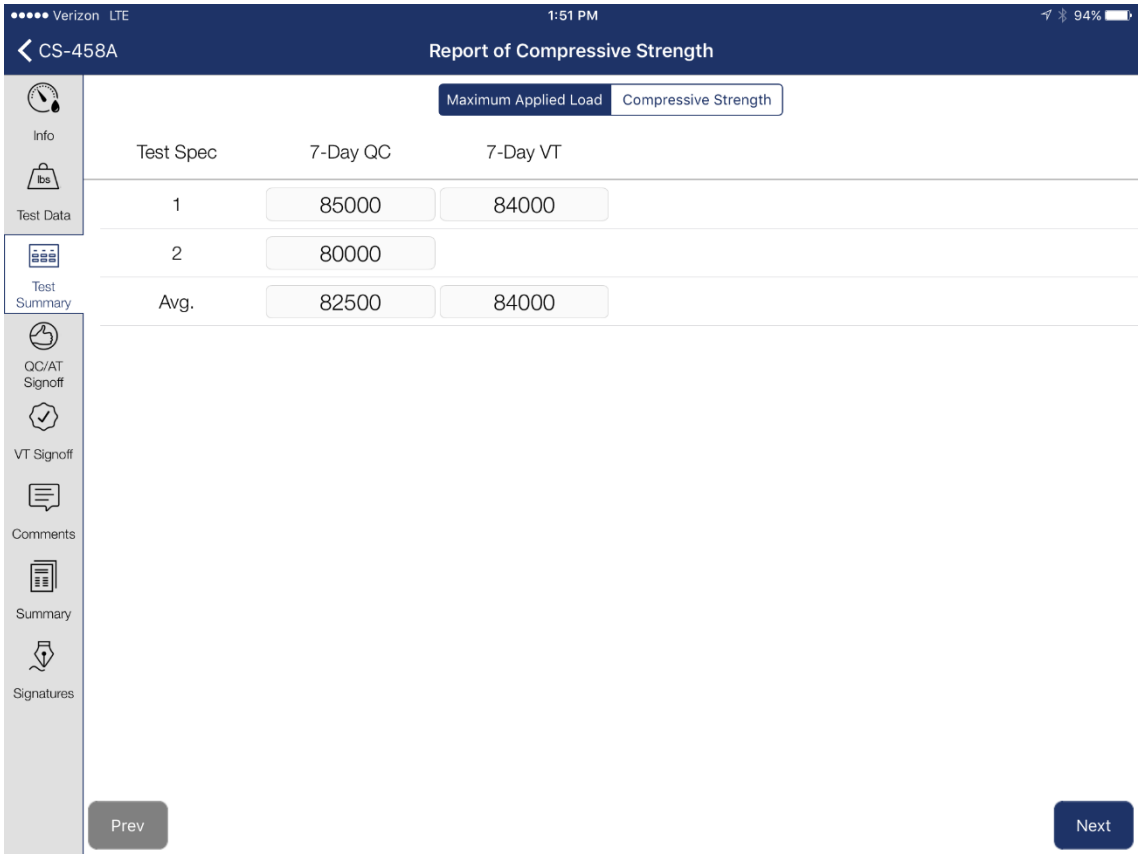

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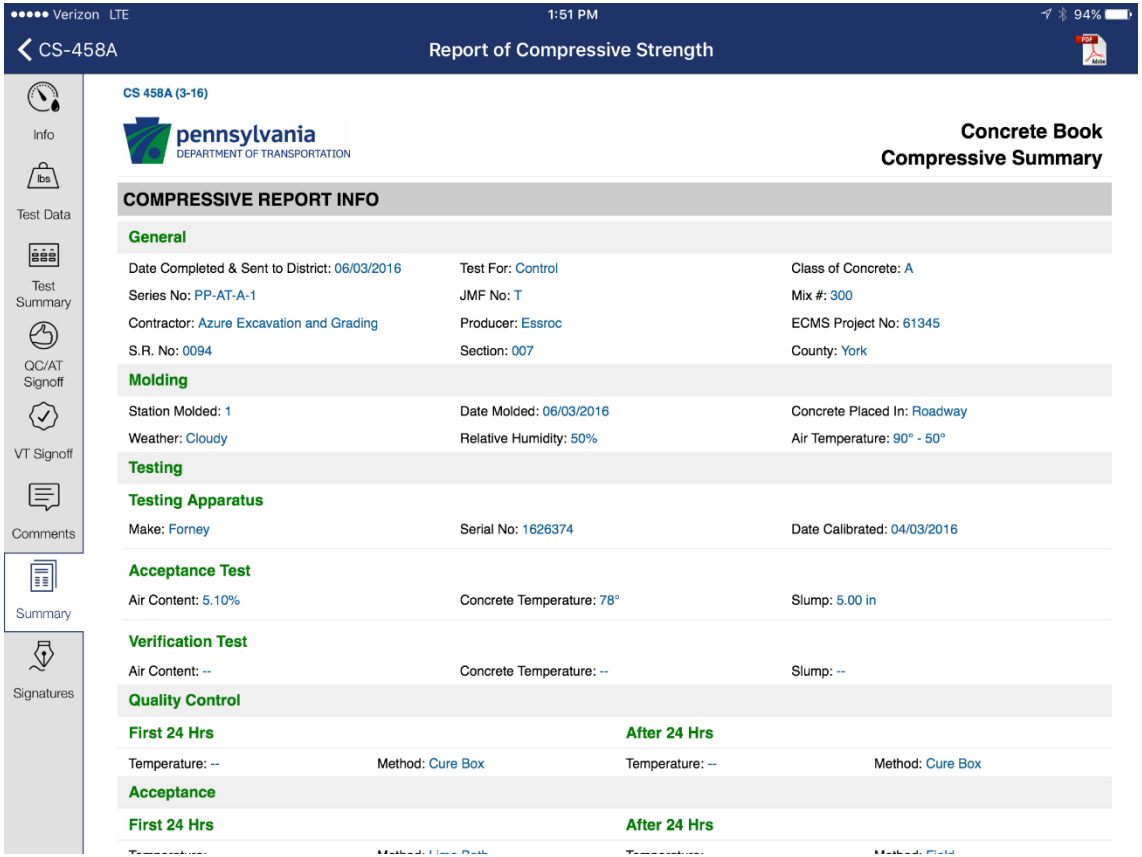

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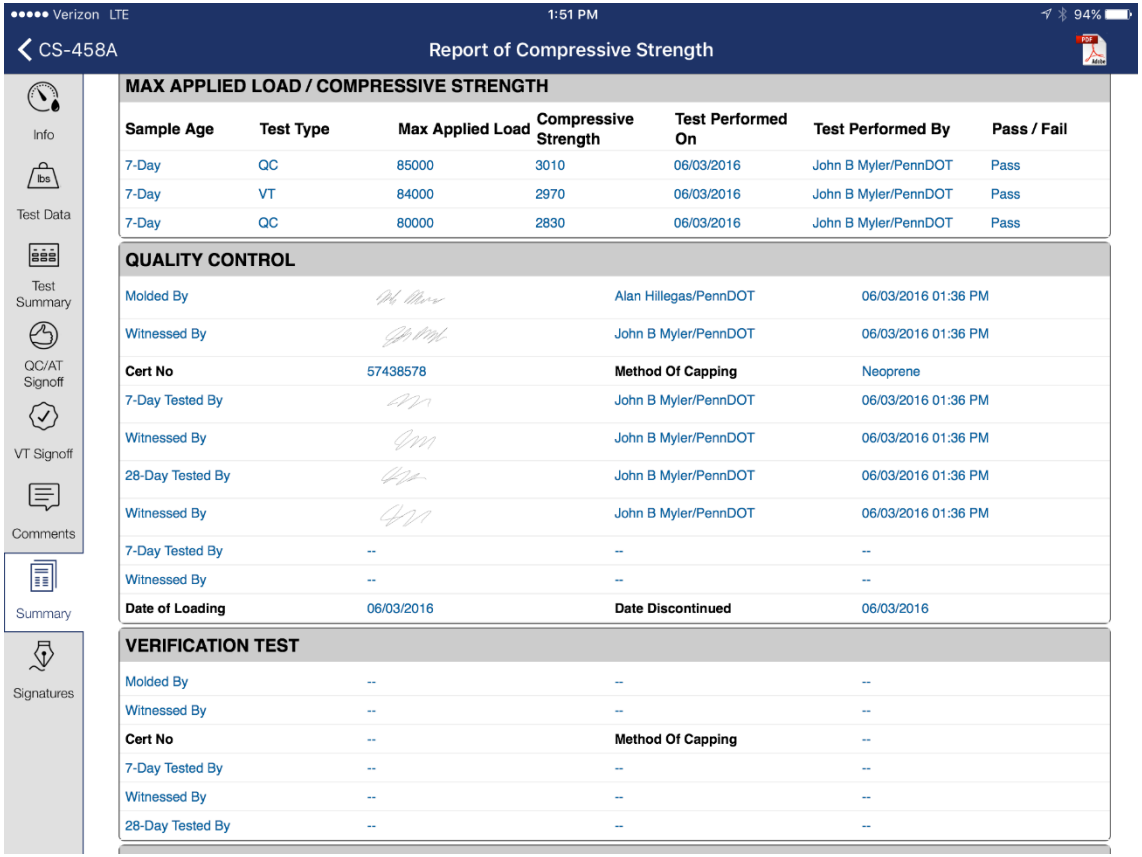

MAX APPLIED LOAD / COMPRESSIVE STRENGTH

Sample Age	Test Type	Max Applied Load	Compressive Strength	Test Performed On	Test Performed By	Pass / Fail
7-Day	QC	85000	3010	06/03/2016	John B Myler/PennDOT	Pass
7-Day	VT	84000	2970	06/03/2016	John B Myler/PennDOT	Pass
7-Day	QC	80000	2830	06/03/2016	John B Myler/PennDOT	Pass

QUALITY CONTROL

Molded By		Alan Hillegas/PennDOT	06/03/2016 01:36 PM
Witnessed By		John B Myler/PennDOT	06/03/2016 01:36 PM
Cert No	57438578	**Method Of Capping**	Neoprene
7-Day Tested By		John B Myler/PennDOT	06/03/2016 01:36 PM
Witnessed By		John B Myler/PennDOT	06/03/2016 01:36 PM
28-Day Tested By		John B Myler/PennDOT	06/03/2016 01:36 PM
Witnessed By		John B Myler/PennDOT	06/03/2016 01:36 PM
7-Day Tested By	--	--	--
Witnessed By	--	--	--
Date of Loading	06/03/2016	**Date Discontinued**	06/03/2016

VERIFICATION TEST

Molded By	--	--	--
Witnessed By	--	--	--
Cert No	--	**Method Of Capping**	--
7-Day Tested By	--	--	--
Witnessed By	--	--	--
28-Day Tested By	--	--	--

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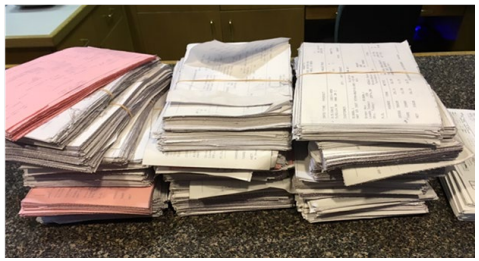
Electronic Ticketing

Why Electronic Ticket?



- Eliminate Paper Tickets
- No More Lost Tickets
- Provide Materials and Tonnage Verification
- No Time-Consuming Ticket Sorting
- Quickly Summarize Tickets for Contractor Payments
- Reduce Worksite Hazards For Inspectors Frequently Dodging Trucks

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Why GPS Tracking?

Information can be used for analysis and forensics of vehicle histories. For instance:

- Designed To Reduce Costs Associated with Over-Trucking or Under-Trucking
- Eliminate Bottle-necks at Paver and/or Plant
- Hold Drivers Accountable For Performance and Production
- Optimize Cycle Times – Move More Tonnage
- Virtual Shift Tickets to Automate Payroll Processes
- Scales Integration to Help with Job Costing / Future Bidding
- Alerts / Notifications to Management When Benchmarks Fall Outside of Norm
- Track Paver Speed for Production

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Electronic Ticketing Pilots

- In 2017, District 11 Piloted e-Ticketing on 4 Group Roadway projects in Allegheny County.
- The Districts Special Provision took the e-Ticketing one step farther to also include GPS tracking of equipment.
- This resulted in the Special Provision titling of: **Electronic Delivery Management System For HMA/WMA Material.**
- Another Special Provision was also added for tracking the delivery of milled materials to a specified plant or stockpile site.
- About to enter our 4th season.

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Special Provisions Overview

- GPS tracking of all equipment associated with paving and milling operations
- Full GPS integration with plant scale system
- Ability to measure and track material from plant to final placement destination
- Provide the data real-time with a web-based system compatible with iOS and windows environments

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FleetWatcher Features

- GPS and Ticketing all in one system.
- System is fully integrated with the Asphalt Plant
- Ticket data is available in a CSV file format

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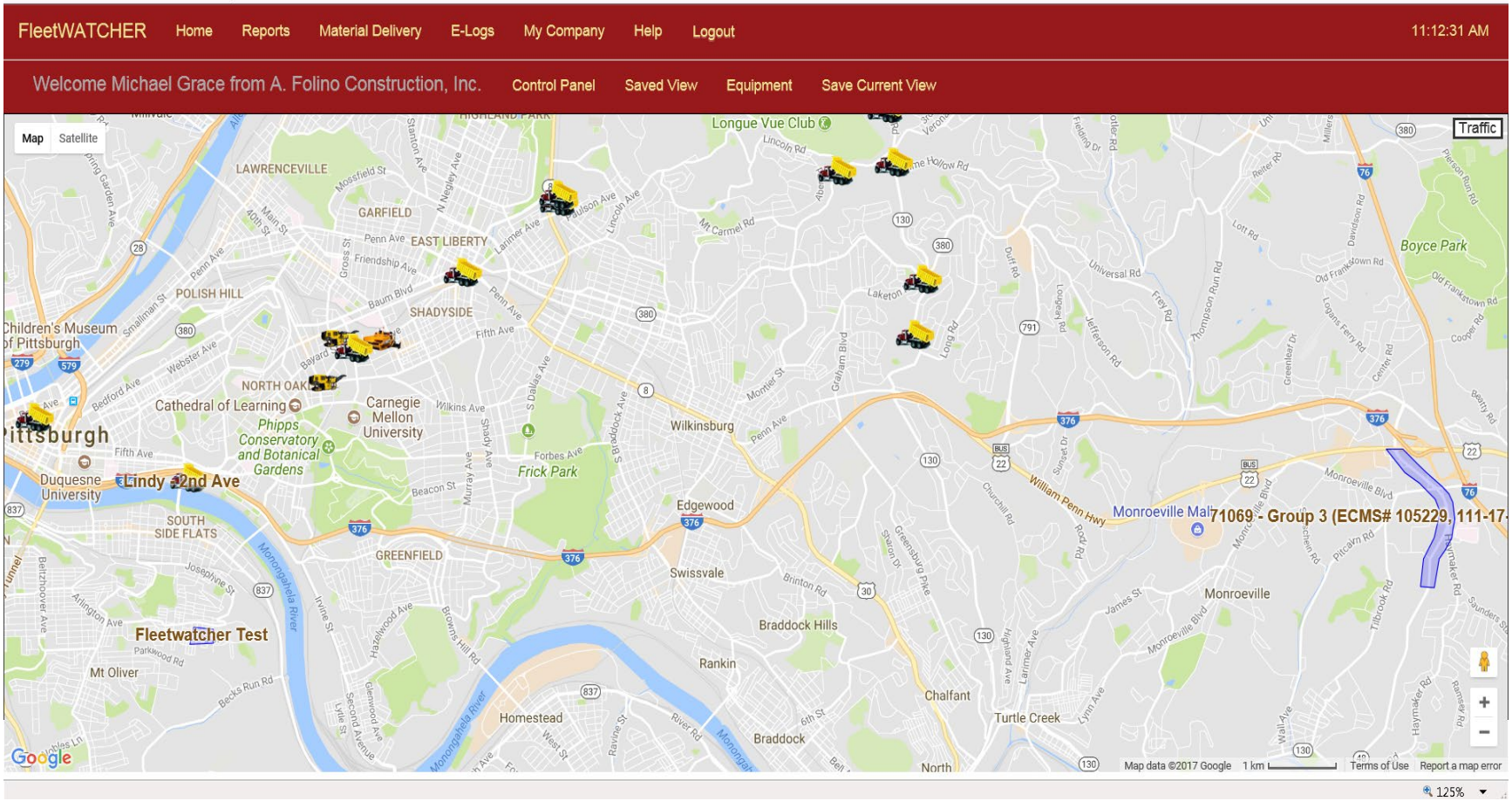
Fleet Watcher Real-Time Mapping



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Fleet Watcher LCA Line Graph Report

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PennDOT e-Construction Initiative

- E-Ticketing 2.0
  - District 11 Pilot Projects
  - PennDOT Evolution of the E-Ticketing Process
- Construction Contractors App Access and Functionality
  - APC STIC
  - Providing Access Improves Both Parties
- Support for PennDOT Maintenance Systems
  - Construction Data Evolves Into Maintenance Data
  - Guiderail Mobile App
- RFID Tags
  - Material Sample Tracking
  - Asset Management
  - PreCast Products

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PennDOT e-Construction Initiative

- Photographic Documentation and Photogrammetry Contour Mapping Services
  - District 11 Pilot Projects
  - Plans overlaid on Arc GIS Map
  - Ground and UAS photogrammetry
  - Mobile App for inspection photos with Geo Tags
- Plan Less 2025 i.e. 3D Model Designs
  - Construction will be ready…

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PennDOT's Return On Investment

Project	Initiation Dates	Development Cost	Overall Savings
CDSv3	August 2012	$ 4.0 million	$13.5 million
Release 1 implemented 8-18-14			
Mobile Construction	July 2012	$2.3 million	$39 million
Sprint 1 implemented 9-6-12			
Sprint 74 implemented 4-1-19			
PPCC	October 2011	$6.3 million	$34.4 million
Release 1 implemented 9-13-13			
eCAMMS	January 2012	$6.9 million	Being assessed
Implemented April 2014			

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Contact Information

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