

# Building Capacity with Technology

February 9, 2022

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# MassDOT's Innovative Approach

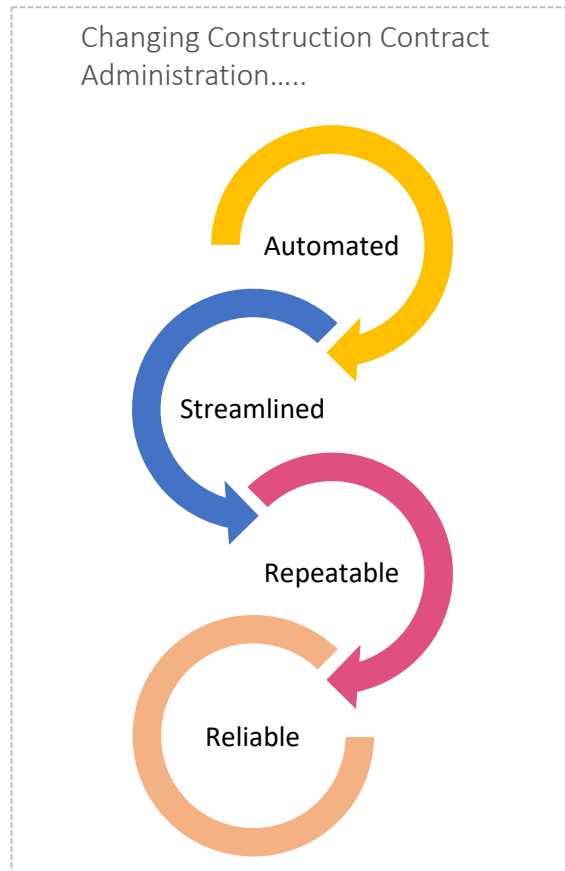
- **e-Construction**
  - LIMMS, SAM and SharePoint
- **e-Ticketing: Every Day Counts (EDC) Round 6 Pilot Program**
- **Training, Internships/Co-Ops and building a pipeline of Civil Engineers**



Aerial view from our drone: MassDOT Acceler8 project on the Mass Pike in Southborough

# MassDOT's e-Construction Vision

**Simplify Construction Contract Administration to allow personnel to focus on their core duties both in the field and in Park Plaza/District Offices by:**



- **Capturing data electronically in the field once**
- Allowing for **review and approval** of documents, **electronically**
- Providing MassDOT personnel and trusted third parties **access to Contract Information in a secure manner** to support their day-to-day jobs and **clear understanding of projects status**
- **Streamlining Contract Administration** both in the field and the main office
- **Dashboard** for construction **program information and performance**

# Additional MassDOT e-Construction Goals

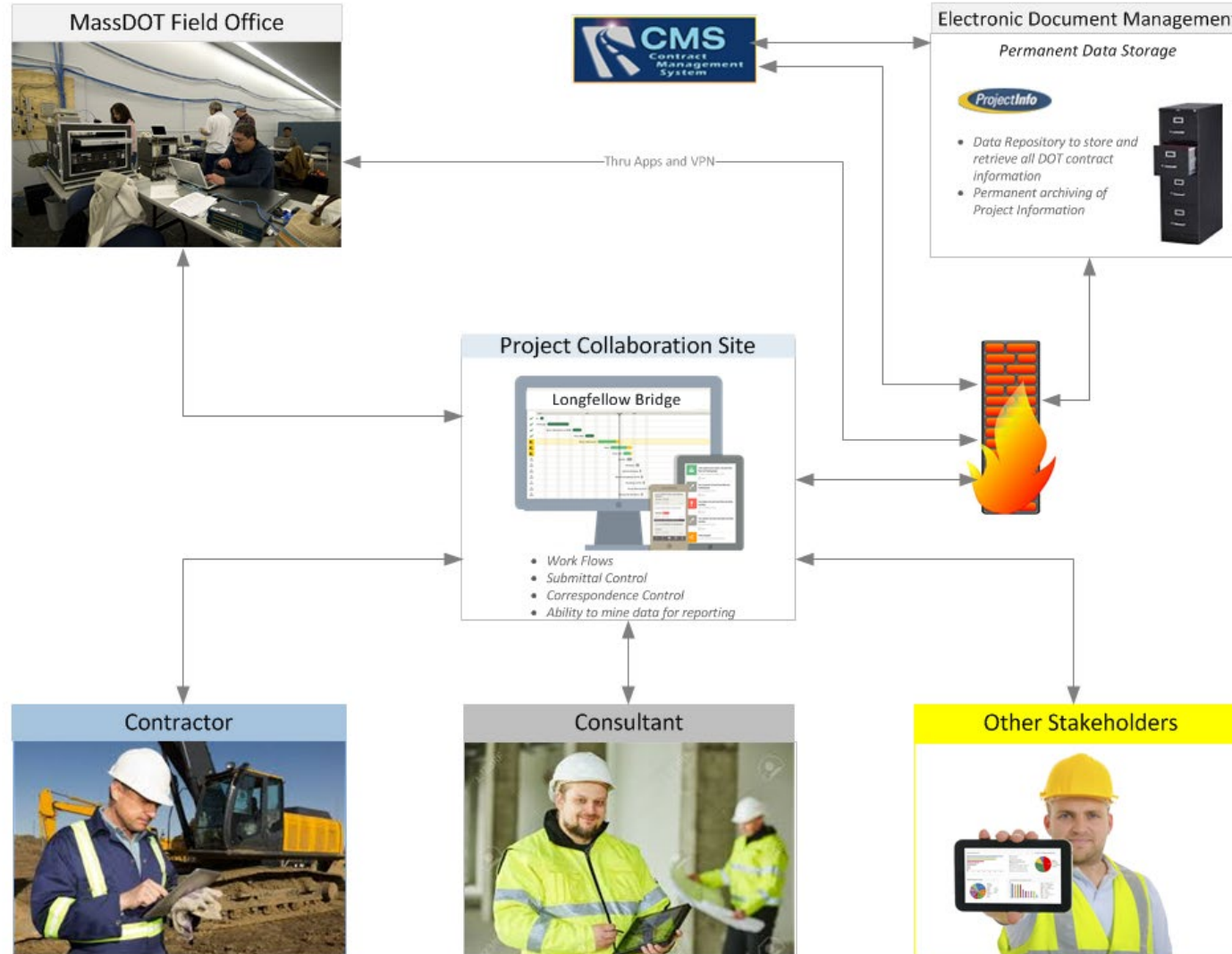
- **Increase the percentage of time inspectors spend in the field vs. field office**
  - **Past: 50%** of inspectors spend greater than 50% or more of their time doing paperwork
  - **Current: 75%** of inspectors spending 75% of their time in the field
- **Reduce the time and cost of printing**, mailing, storage and travel.
- Implement **e-Signature for all Construction** related project activities.
- Provide a single source when it comes to data and documents
  - **Enter information once** and make the same version available to MassDOT personnel, FHWA, Contractors and Consultants
- **Review current business processes from Design to Construction.**
  - No value in just automating a bad manual process. Need to evaluate the current process prior to changing over

# e-Construction Expected Challenges

- **Training, Education, and Cultural Change**
- Embracing and adopting **new technologies** (mobile devices)
- Overcoming the fear of little to **no more paper**
- Communication/Education of all MassDOT e-Construction Stakeholders
- **Digital Signatures and Legal concerns**
  - Education and Outreach
  - Compliance
- **Aligning DOT and IT goals**
  - IT security
  - IT infrastructure including accessibility



# What e-Construction Looks like at MassDOT





Day of Week:  
**Wednesday**

Report Date:  
3/2/2016

Start Date:  
3/2/2016

End Date:  
3/2/2016

Inspector:  
Sardar Jajan

Project:  
Longfellow Bridge Replacement

Contract No:  
604361

District:  
D6

Report No:  
2016-03-02-0700-Sardar Jajan

General Contractor:  
White Skanska Consigli, JV

File No:  
D6-72699-CNST-2016-03-02-0700-Sardar

Weather AM:  
Rain

Weather PM:  
Overcast

Temp AM:  
35 deg. F

Temp PM:  
46 deg. F

Weather Conditions:

Survey Parties:

Workforce, Equipment and Work Performed (3, 3)

1. Contractor

3-J.F. White Skanska Consigli, J.V. (Phase 1)

Item No(s):

995.11 LONGFELLOW RDWY. BR. SUPERSTR. SPANS 1-10

992.14 ALT. TO LONGFELLOW BR. SUPERSTR. ; STEEL

114.11 Demo. Longfellow BR RDWY Superstructure, S

995.12 ALT To Piers 1-10 including Towers.

995.13 pedestrian bridge replacement - Bridge # B-16

992.11 ALT. to Boston & Cambridge abutments(includ

Photos:

Click here to insert a picture

Workforce, Equipment and Activities:

1-superintendent, 1- QC

\* QC Oversee ABE Rotational capacity test for new E bolt

\* Pipe fitters

1- foreman, 1- journeywoman, 2- apprentices. Minor

\* Work performed lining up steam line and condensate using come along winches in span 2

\* Note: pending issue.

- Ornamental hand rail panel crack founded by WSC span 4 panel 3, 6, 7, 10, Span 5 panel 3.

- Ornamental handrail post in span 12. Base plate in m are installed the hand rail while the issue of the painting not resolved. The QC said that the hand railing post on base will remain in white paint. As of the outside area rail post will be painted in finish he said that there was of change accepted by MassDOT. I have asked QC, it documented.

- Note: pending issue.

- Span 3, 4, 5, 6 & 7 the installed ornamental handrail post joint is not setting flush with the bottom flat bar result an even elevation between joints and hand rail is from. completed work.

-MassDot working to produce go back fix list for un er and paint issue partial postMassDot working to produ for un even cap elevation, and paint issue partial post mid coat only.

\* See attached go back fix List. span 1- 12, Generated inspector.

Sketch:

Click here to attach a file

Affected Drawings:

Click here to attach a file

Initiation

3. Subcontractor

3CC- Nasdi Phase1/ stage 3

Item No(s):

114.11 Demo. Longfellow BR RDWY Superstr

Photos:

Click here to insert a picture

Workforce, Equipment and Activities:

7:00 am - 3:30 pm

1- foreman, 1-operator, 1- truck driver, 1- V truck

\* Continued haul away demolition debris at

1:30 Pm - 3:30 Pm

1- Foreman, 9- Laborers, 3- Operators, 1-Ka Volvo Excavators, 1- Air compressor, 1- ga Trucks, 1- Generator, 2- welding cutting w

\* Continued demolition span 4 upstream of Inbound dead Tracks work performed contin beam , stringers & spandrel columns from 4

\* Continued cleaning safespan platform /Re span 4 of arch rib EU- Pu

\* Continued removing generated concrete di to temporary Cambridge & Boston side was

Sketch:

Click here to attach a file

Affected Drawings:

Click here to attach a file

6. Subcontractor

3 BB- Regis steel corp.

Item No(s):

995.13 pedestrian Bridge replacement- Bridge # B-16-43B(9XL).

Photos:

Click here to insert a picture

Workforce, Equipment and Activities:

1- Foreman, 2 Journeyman.

\* 1- Ironworkers did not report to work performed due to the rain

Sketch:

Click here to attach a file

Affected Drawings:

Click here to attach a file

Visitors (5, 5a, 5b, 6, 7, 8)

Visitors:

\* Paint inspector Mike Spires from KTA Paint and Coating Consultants hired by MassDOT oversee Tri state painting, Inc., painting operations.

Law Enforcement Details (7)

1. Entity:

Qty:

2. Entity:

Qty:

3. Entity:

Qty:

4. Entity:

Qty:

5. Entity:

Qty:

Other, Please specify:

Qty:

Materials Special Tests (9)

Progress and Record Samples Taken:

Contract Management (10, 11)

EWOs, Alterations, Claims, etc:

ABE - No work performed due to the rain.

Photos:

Click here to insert a picture

# Field Inspection Reports

2021:

1.03 Billion in spending

51,200 Inspection Reports on 545 Contracts

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Right of Way Matters (12)

Accidents (12)

Accident Description:

Photos:

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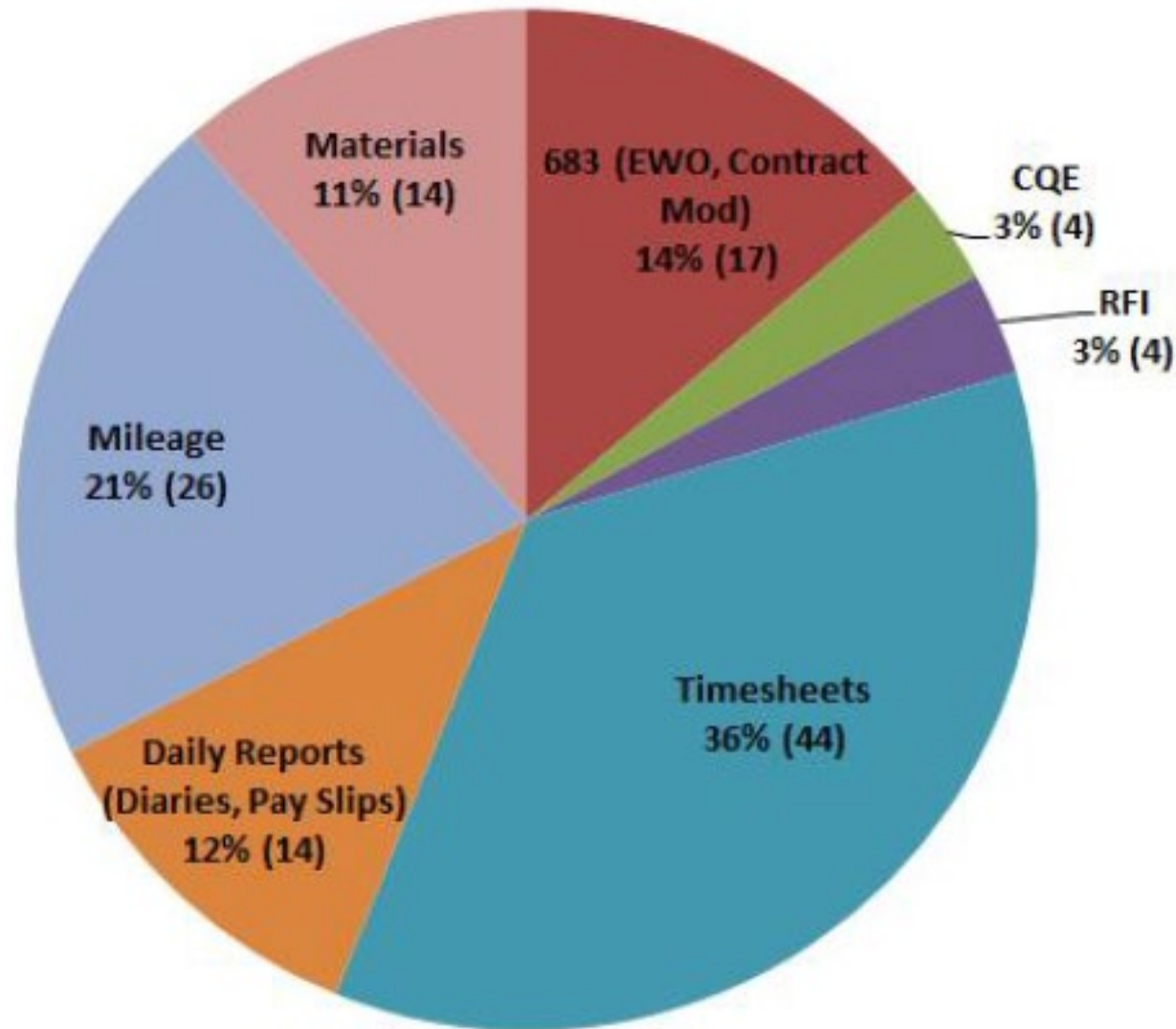
Traffic Conditions (15, 15a)

Traffic Conditions:

Miscellaneous (16)

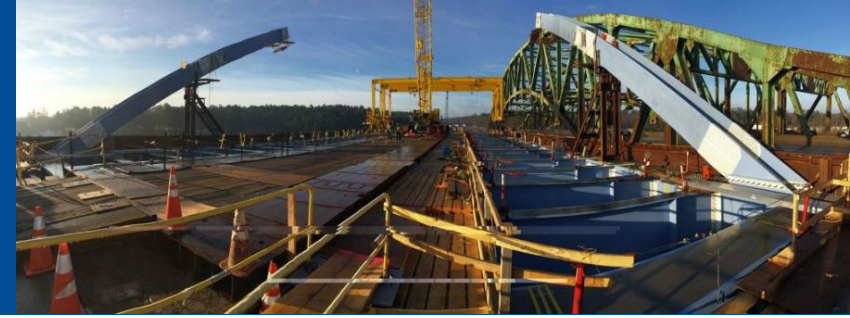
Notes:

# Routine activities that benefit from e-Construction





# Managing Construction in SharePoint



- The **need for a collaborative product** was initiated in 2013 to support the Accelerated Bridge Program.
  - MassDOT wanted a tool that would **assist all entities in managing design and construction processes on one platform.**
  - Within six months due to **positive feedback** from all entities **all future Design-Build Contracts are managed on SharePoint.**
- MassDOT currently has **95 active SharePoint** sites inclusive of Design Bid Build and Design- Build, with several pending release.

# Types of Projects and Electronic Forms Managed in SharePoint

- Design Build: 10 SharePoint Sites
  - Design Bid Build: 84 SharePoint Sites
  - MassDOT Cement/Concrete Producer SharePoint sites for years 2017-2022
  - Post Construction
  - Resident Engineer Manual
  - CCLR - Contractor Certificate Letter Review
  - Go Time Systems Statewide
- Transmittals (Contractor to MassDOT)
  - Transmittals (MassDOT to Contractor)
  - Request for Information
  - Non-Conformance Report
  - Design Change Notice
  - Field Change Notice
  - Materials via Item for Review and Approval

# Bluebeam/SharePoint Metrics

District	Contract	Submittal Response Metrics		RFI Response Matrix	
		Average Response Days	Number of Records	Average Response Days	Number of Records
1	108890	10.74	87	20.09	67
2	102136	13.85	114	20.67	6
3	108887	13.52	104	10.75	8
3	110906*	11.79	266	14.41	22
4	109691	16.64	129	14.59	86
5	112402	13.43	242	10.04	71
6	102269	20.08	935	10.02	495
* DB					

# MassDOT's e-Ticketing Pilot Program

**Our goal is to replace paper tickets with electronic tickets for HMA and Concrete deliveries.**

- **Safety**
  - e-Ticketing enhances data collection while reducing exposure to adjacent vehicular traffic and construction equipment for inspectors and work crews while retrieving paper tickets.
- **Time Savings**
  - Real-time access, via electronic handling of tickets, reduces processing time for quality assurance and payment, decreasing the inherent delays in paper-based project administration.
- **Quality**
  - Project documentation is more consistent and efficient using e-Ticketing platforms. Standardized data enables archiving for future reference, leading to improved design, construction, maintenance, and operations.

# MassDOT's e-Ticketing Pilot Program

**Approximately 18 months ago we started our EDC-6 e-Ticketing initiative**

**Our primary focus to date has been on the HMA industry as most HMA suppliers have started to adopt this technology. We are also looking to incorporate e-Ticketing in ready mix concrete as well.**

## **Pilot Projects**

Contract	Description	Contractor
110346	Peabody – Route 128 Resurfacing	Brox
111027	Athol-Phillipston – Route 2 Resurfacing	Warner Brothers



# MassDOT's e-Ticketing Pilot Program

## Summary of field staff survey results:

- Ease of use for desktop and mobile application – 4.25 out of 5
- Accuracy of data – 9 out of 10
- Cell service issues reports – 0
- Worth noting, we only received positive feedback from the surveys

## Data Storage

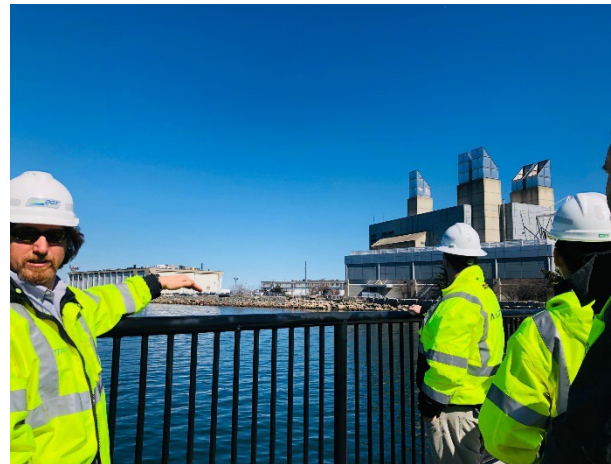
- Data is being ingested through our GIS servers after it is finalized/signed off on by the state inspector and supplier.

## Future Plans

- Automation of payment quantities in our payment software for HMA and Concrete quantities based on e-Ticketing data.
- Full automation of price adjustments for HMA and Concrete

# MassDOT's Highway Core Curriculum

- **Developed in 2014** to facilitate training for a new “Fellows Mentoring Program”,
- Due to the popularity of the classes and an influx of new hires transfers it was **opened to all MassDOT employees**
  - To date **526 participants** have attended
  - **45** various classes are offered
- Provides module training from **Project Development, Design, Advertisement, Construction to Finals Close-out**
- The HCC participants have had the opportunity to **participate in Field Trips** to the following:
  - Whittier Bridge Project
  - Longfellow Project
  - Boston Commonwealth Ave Project
  - Highway Operations Center
  - Vent Buildings Volpe Center
  - Research and Materials Laboratory



# MassDOT's Highway Internship/Co-Op → CE I Process

- MassDOT Internships and Co-Ops are **year-round**
  - Can come back during school breaks or for a 2<sup>nd</sup> internship/Co-Op
  - Returning interns don't need to be interviewed, just asked preference of work section
- **Mentor Program for Interns/Co-Ops (in groups) with MassDOT leadership**
- Interns/Co-Ops work on a project and **present the project to their peers and supervisors** at the end of the summer
  - 1 representative from each District/HQ presents to the Secretary's Office and other MassDOT Officials in a larger Internship/Co-Op Symposium
- **Interns/Co-Ops are offered a CE I position immediately after a successful internship/Co-Op**
  - Engagement with MassDOT staff throughout the year until they officially join MassDOT after graduation
- CE Is attend the **Highway Core Curriculum**, MassDOT pays for/hosts **EIT prep courses**, and encourages them to enroll in **MassDOT's Mentorship Program**

# Questions?

## Contact information:

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Image source: [MassDOT](#)