

# Drone Interim Policy

-Board Presentation-

Monday October 16, 2017

*Presented to:*

■ **Board of Directors**

*Presented by:*

■ **Aeronautics Division**

➤ **Dr. Jeff DeCarlo**

# Overview



- Drones are widely available and are an opportunity for MassDOT and the MBTA as potentially cost effective and useful tools to support our missions and core activities, including:
  - Asset management and infrastructure inspections;
  - Drones will NOT be used for surveillance or intentional collection of Personally Identifiable Information
- A policy will insure that internal usage will meet:
  - Legal, standardized methods to access drones, and
  - Support and oversight to operate drones safely and effectively
- Staff Requests that both Boards vote to adopt the interim drone policy. A draft/suggested policy has been provided

# MassDOT & MBTA Drone Demonstrations: Takeaways

| <u>Aeronautics</u>  | <u>Rail &amp; Transit &amp; MBTA</u>   | <u>Highways</u>  | <u>MEMA</u>   |
|---|--|--|---|
| <ul style="list-style-type: none"><li>• Airport inspection</li><li>• Accident investigation</li></ul> | <ul style="list-style-type: none"><li>• Rail inspection</li><li>• Subway tunnel inspection</li></ul> | <ul style="list-style-type: none"><li>• Bridge inspection</li></ul>                | <ul style="list-style-type: none"><li>• Disaster response</li></ul>                 |
|                       |                     |  |  |

1. Far more potential missions / use cases than expected!
2. Users need help finding and using the correct drone tools for the job
3. Data collection, analysis and protection is the “Long Pole” for majority of missions

# Proposed: Drone Pilot Program Objectives



- **Demonstrate drone capabilities to support MassDOT and MBTA missions, and document best practices and lessons learned**
- **Develop MassDOT and MBTA policies and processes for acquiring and using drone assets, and for analyzing and securing data acquired from drones**
- **Conduct cost-benefit analyses to include:**
  - **Compare drone methods vs. traditional non-drone methods for each use-case**
  - **Determine the optimum drone-use business model: Employee vs. vendor (or blend)**
  - **Identify new capabilities enabled by drones that support MassDOT/MBTA operations**

# **Proposed: Drone Pilot Program Objectives (continued)**



**Develop MassDOT Aeronautics knowledge base to support MassDOT & MBTA divisions in solving problems using drones**

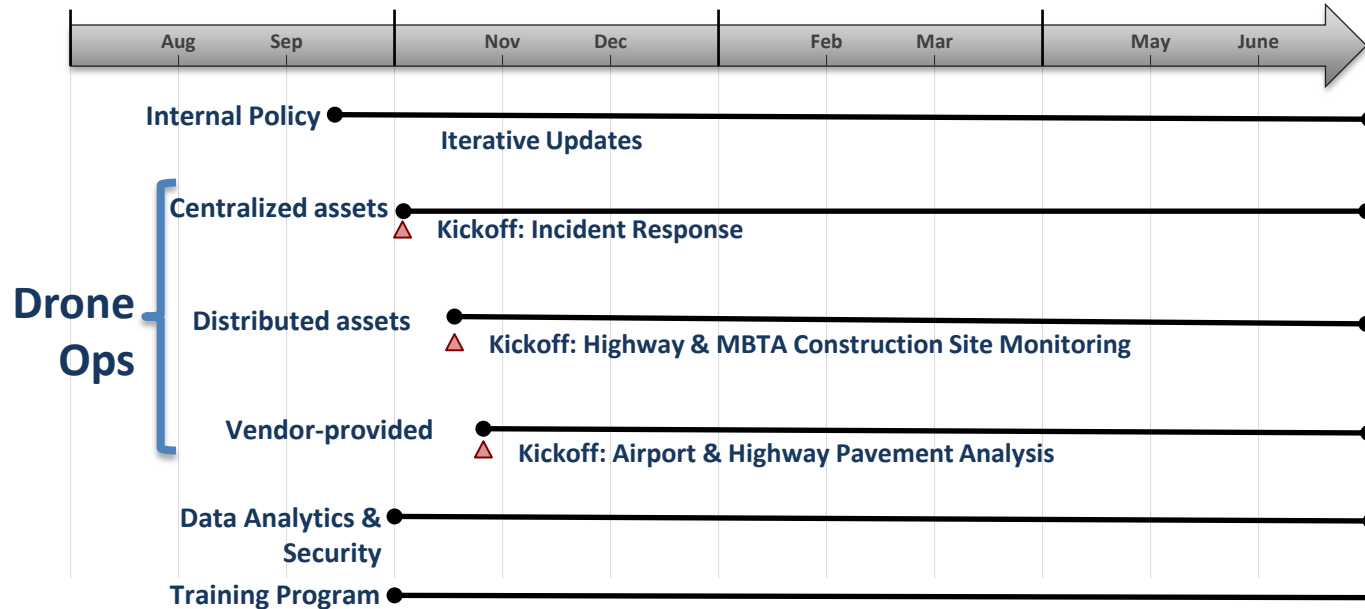
**Develop a process to advise and assist other Commonwealth agencies with their drone programs**

**Using pilot programs to systematically implement and evaluate drone applications, MassDOT and the MBTA will develop safer, optimized solutions for those areas where drones may offer a cost-effective alternative.**

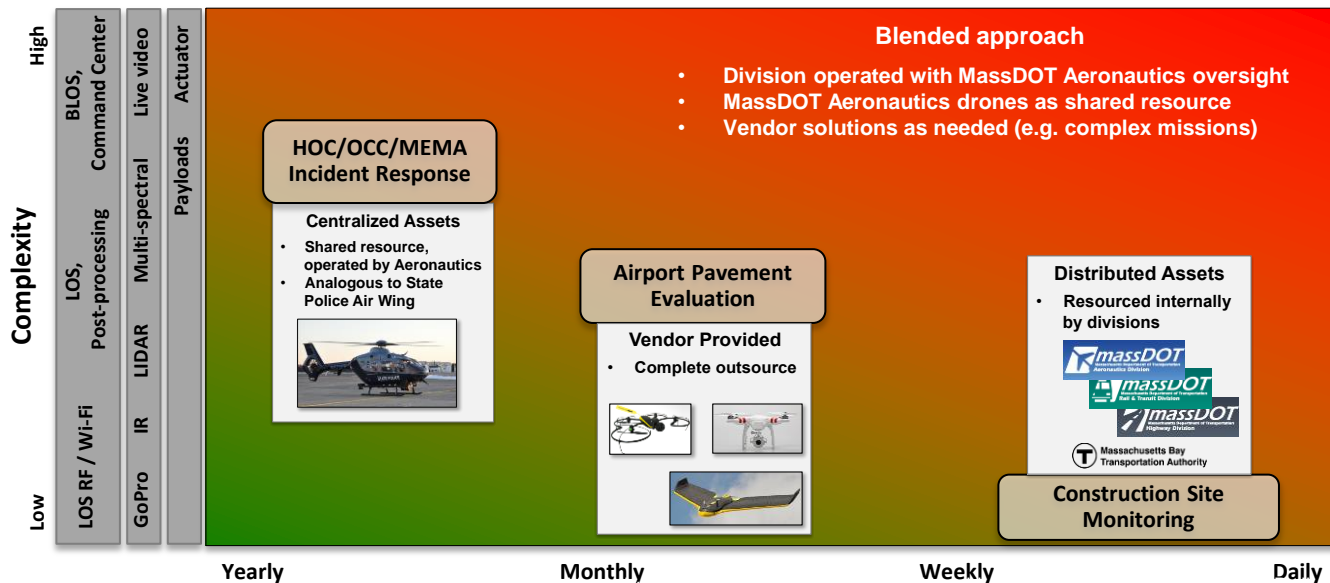
**Communication and collaboration with other Commonwealth agencies will allow both agencies to take advantage of best practices and lessons learned.**

# Design: Drone Pilot Program Schedule

## Phase 1 (6-Tracks)



# Design: Pilot Program Candidates



**No “One Size Fits All” approach for incorporating drones into MassDOT & MBTA Operations**

\* Aggregate demand across transportation in Commonwealth

# Design: Drone Policy Steering Committee



- **Nine-member Drone Policy Steering Committee to meet quarterly, or as needed, to iteratively address and adjudicate changes**

| Name                         | Org/Position   |
|------------------------------|--|
| Stephanie Pollack            | MassDOT Secretary of Transportation                            |
| Jeffrey DeCarlo              | MassDOT Aeronautics Administrator                              |
| John Englander & Marie Breen | MassDOT/MBTA General Counsel                                   |
| Kate Fichter                 | MassDOT Assistant Secretary for Policy                         |
| Faine Greenwood              | Harvard Humanitarian Initiative                                |
| Tracy Klay                   | MassDOT/MBTA Deputy General Counsel, Aeronautics Chief Counsel |
| Paige Scott-Reed             | Anderson & Kreiger Outside Counsel                             |
| Monica Tibbits-Nutt          | MassDOT Board of Directors                                     |
| Scott Uebelhart              | MassDOT Drone Program Chief Scientist                          |



# Interim Drone Policy



**Scope:** Applies broadly to both employees and contractors performing MassDOT and MBTA work

## Commitments:

- **Safety:** MassDOT and the MBTA will prioritize safety and develop Safety Management Systems to minimize risk
- **Respect for Privacy:** MassDOT and the MBTA will be guided by utmost respect for privacy, including constitutional requirements, state and federal laws, regulations, and norms protecting privacy. As a precautionary measure, MassDOT and the MBTA will not use UAS to intentionally collect images over private property without prior authorization from the Secretary of Transportation or express permission from the property owner
- **Data Retention and Usage:** MassDOT and the MBTA will:
  - Avoid gathering more information than is needed to meet its documented purposes
  - Comply with the requirements of the Public Records Law and the requirements for record retention, and
  - Guard against unintentional or unauthorized disclosure of information

## Commitments (cont.):

- **Cooperation with Law Enforcement:** MassDOT and the MBTA will cooperate with law enforcement by sharing information gained from the use of UAS in limited emergency situations involving imminent and immediate threat to the safety, health, and well-being of an individual or the public based on specific, reasonable intelligence sufficient to necessitate the need to provide such information to law enforcement
- **Collection of Personally Identified UAS Data** (UAS data in which a specific person is recognizable or that is linked to an individual's name or other personally identifiable information)
  - Notification procedure
  - Reasonable steps to avoid gathering or retaining unnecessarily

## Procedural Requirements:

- No use of employee-owned UAS
- UAS use must comply with state and federal law (including FAA regulations and guidance)
  - UAS must be lawfully manufactured and sold, as well as properly registered
  - Operators must be FAA licensed
  - Waivers, permits, approvals, and authorizations for flight must be obtained in advance
  - Notifications of flight and data gathering must be provided on a timely basis, if required
- UAS flights must be logged

## Responsibilities of MassDOT Aeronautics:

- Confirm compliance with law and policy prior to UAS use
- Approve all procurement of UAS or UAS services
  - In isolation or as part of a broader project
  - Unless the Secretary of Transportation directs otherwise in writing
- Oversee operator certification and training requirements

# Conclusions



- **Drones are widely available and are an opportunity for MassDOT and the MBTA as potentially cost effective and useful tools to support our missions and core activities, including:**
  - **Asset management and infrastructure inspections;**
  - **Drones will NOT be used for surveillance or intentional collection of Personally Identifiable Information**
- **A policy will insure that usage will meet:**
  - **Legal, standardized methods to access drones, and**
  - **Support and oversight to operate drones safely and effectively**
- **Staff recommends that the Joint Board vote to adopt the interim drone policy**

# Backups

## Internal Drone Policy and Procedure Development Process

(Process to gather input and feedback from internal team and external stakeholders)



## MassDOT Drone Policy – Internal (Overarching Internal Drone Policy)

**MassDOT Drone Policy – External**  
(Operations of Drones Over or Near MassDOT Assets)

**MassDOT Aeronautics Guidance to Municipalities**  
(Clarification of FAA Pre-emption and MassDOT Aeronautics Guidance)

**MassDOT Aeronautics SOPs**  
(Standard Operating Procedures)

# Technology : Small UAS Types

**Rotary Wing  
Drone (Hover Capability)**



**Fixed Wing  
(Range)**



**Tethered  
(Persistence)**



# Drone Classifications

| FAA Order | Drone Size       | Weight      | FAA Rules                              | Date                | Altitude                | Notes         |
|-----------|------------------|-------------|--|---------------------|-------------------------|---------------|
| 1         | Small UAS (SUAS) | 0.55 - <55# | COA, 333, Part 107 (Waivers) Day, VLOS | Final Rule Aug 2016 | NAS to 400' (structure) | Current Focus |
| 2         | Micro UAS        | < 0.55#     | In-Progress                            | In-Progress         | In-Progress             | In-Progress   |
| 3         | Medium-Large     | TBD         | TBD                                    | TBD                 | NAS Alts TBD            | Test Sites    |



# Technology: Sensors

**HD Camera**



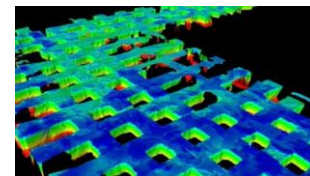
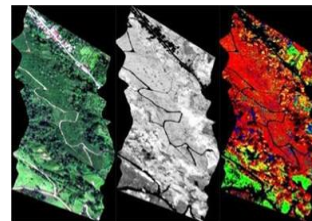
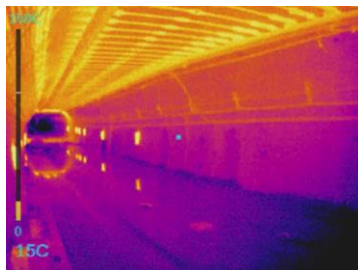
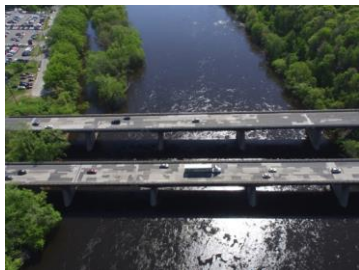
**Infrared**



**Multispectral**

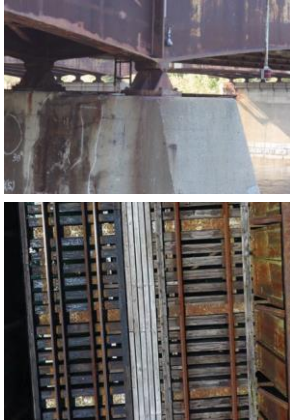


**LIDAR**



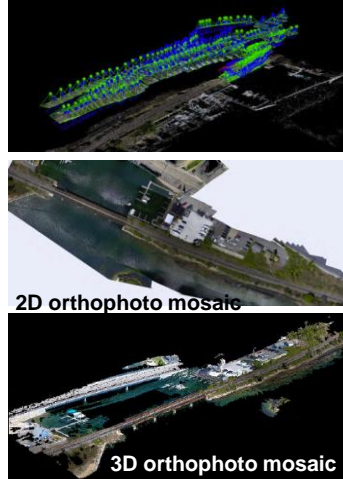
# Technology: Data Products

## Imagery & Video



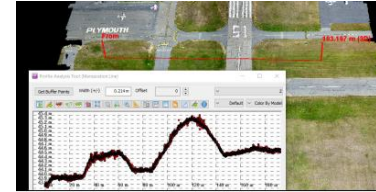
Take imagery of  
hard-to-access  
locations

## 2D & 3D orthophotos



Measure distances  
using geometrically  
accurate  
photomosaics

## Volumetrics



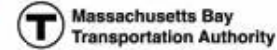
Measure volumes of  
material

## Advanced techniques



Many active areas  
of research

# Link to Demonstration Video

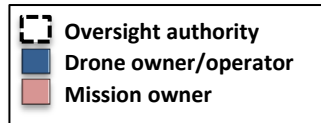
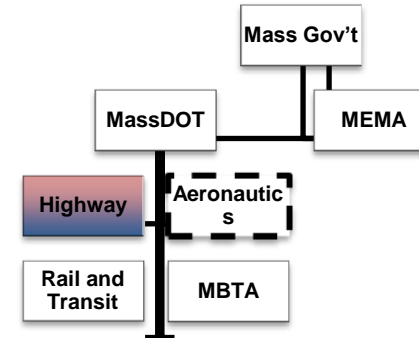
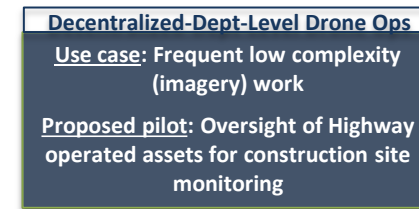
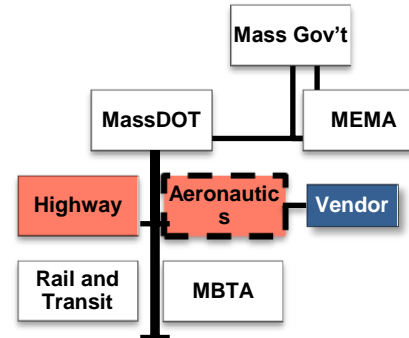
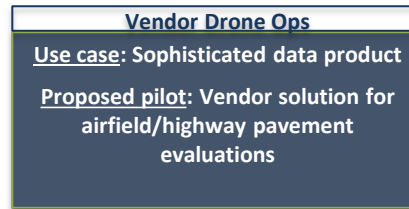
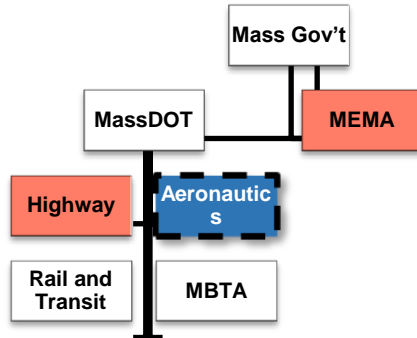
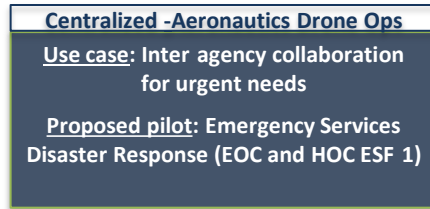


## Drone Demonstration: Lessons Learned

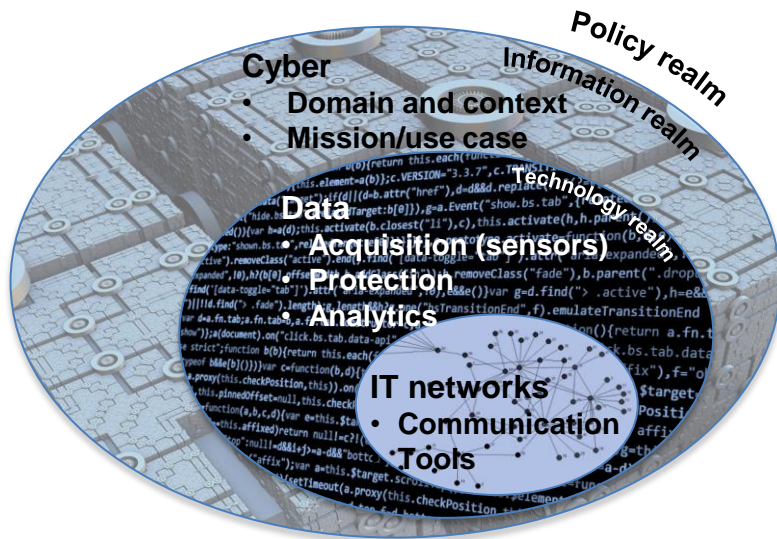
A Collaboration between Mass DOT Aeronautics, Highway,  
Rail and Transit, and the MBTA

May 2017

# Pilot Program: Use Cases & Models



# Data Analytics and Security Pilot



Include data management,  
analysis and security in Pilots

## Objectives:

1. Manage information collected via drone pilots
2. Develop integration with existing DOT infrastructure and explore analysis technologies
3. Incentivize predictive solutions

**Data Analytics and Security are critical to enabling  
drone benefits**

# Commonwealth Agency Drone Collaboration



| Agency                                     | Current Uses & Activities  | Policy   | Benefits & Outcomes                                   | Planned Uses  |
|--|--|--|---|---|
| DFS (EOPSS)                                | Fire Support   | Complete   | Safe Operations, Directed Resources                   | Support Municipalities  |
| EOEEA                                      | EEA is currently considering a limited drone program initially using contractors | If agency use is approved ,EEA to develop policy & SOP | TBD   | Planning Policy and Vendor Use; Aerial surveys of nesting bald eagles (DFW); Remote “gull harassment” in Quabbin Reservoir (DCR); Eelgrass bed mapping along coastline (DMF); Deferring broader uses for time being                     |
| Homeland Security                          | Collaborate with MSP   | Collaborate with MSP                                   | Mission-specific                                      | Continue to collaborate with MSP  |
| MassDOT & MBTA                             | Aeronautics Airport Inspection   | Interim Internal                                       | Up to two-orders of magnitude (Time & Cost)           | Cross-Divisional & MBTA; Drone Pilot Program use-cases  |
| MSP (EOPSS)                                | Traffic Accident Investigation   | Complete   | Traditional 2-3 hours+; Drone-use <10min <sup>1</sup> | All Weather Drone for use cases such as Search and Rescue   |
| MWRA<br><br><i>Note 1: Recent MSP case</i> | Facility Inspection<br>(to be confirmed-see Planned Uses)                        | Unknown  | TBD   | FY 17-Establish a drone program for emergency response and infrastructure monitoring<br><a href="http://www.mwra.com/finance/ceb/fy2017final/divisionsections.pdf">http://www.mwra.com/finance/ceb/fy2017final/divisionsections.pdf</a> |



# Context: Regulatory Framework



- **FAA Preemption:<sup>1</sup> Limits to what we can do at a state level**
  - **FAA owns the airspace**
  - **States and municipalities have traditionally regulated land use, zoning, privacy, trespass, and law enforcement operations**
  - **Despite preemption, many states and municipalities have sought to create drone requirements and prohibitions such as:**
    - **Police must obtain a warrant prior to using a UAS for surveillance**
    - **UAS may not be used for voyeurism**
    - **UAS may not be used for hunting or fishing, or to interfere with or harass individuals hunting or fishing**
    - **May not attach firearms or similar weapons to UAS**
  - **Caution: Recent Decision Overturning Newton, MA Regulations**
- **Federal UAS Regulations**
  - **The FAA Part 107 Regulation sets the guidelines for use of small UAS (<55 lbs) by commercial users of small drone aircraft**
  - **Waiver: Most operational restrictions can be waived by showing that proposed operations can be conducted safely**

Note 1: FAA UAS Fact Sheet, 12/17/2015

## Judge shoots down Newton drone ban

By [adamg](#) on Thu, 09/21/2017 - 2:34pm

A federal judge ruled today that Newton went too far in banning drones from flying over the city without the prior permission of landowners whose property the drones might pass over.

US District Court Judge William Young's ruling is a victory for Michael Singer, a local doctor and drone aficionado [who'd filed the suit](#) earlier this year. In his ruling, Young wrote:

*Newton's choice to restrict any drone use below [400 feet] thus works to eliminate any drone use in the confines of the city, absent prior permission. This thwarts not only the FAA's objectives, but also those of Congress for the FAA to integrate drones into the national airspace. Although Congress and the FAA may have contemplated co-regulation of drones to a certain extent, ... this hardly permits an interpretation that essentially constitutes a wholesale ban on drone use in Newton.*

<http://www.universalhub.com/2017/judge-shoots-down-newtons-drone-ban>  
[http://www.kaplankirsch.com/portalresource/09\\_21\\_17\\_Singer\\_v\\_Newton.pdf](http://www.kaplankirsch.com/portalresource/09_21_17_Singer_v_Newton.pdf)



# Context: MA Laws & Regulations



## MA Laws

- No current MA drone laws
- Four bills currently proposed:
  1. H3496 - An Act relative to unmanned aerial vehicles (in the Judiciary Committee);
  2. H3581 - An Act to regulate the use of unmanned aerial vehicles (in the Judiciary Committee);
  3. S1348 - An Act relative to the use of unmanned aerial systems (in the Public Safety and Homeland Security Committee); and
  4. S1349 - An Act to regulate the use of unmanned aerial vehicles (in the Public Safety and Homeland Security Committee)

## MassDOT Aeronautics Regulation (*To be Promulgated*)

- 702 CMR
  - 8.00: Regulation of Unmanned Aerial Vehicles

*Any rule, regulation, ordinance or by-law enacted by a city or town relative to the use and operation of unmanned aerial vehicles shall be submitted to the Division and shall not take effect until approved by the Division.*

## Drone Laws and Regs in Other States: Approaches vary widely

- VA appears to be leveraging existing laws and regulations to cover drones, while NC appears to be creating many new laws and regulations for drones

# MassDOT Drone Program Next Steps



Finalize selection of specific missions for initial testing

## Adopt Interim Internal Policy for UAS Use

- **Vote by MassDOT Board of Directors October 2017**

Determine metrics for end-of-year cost-benefit analysis

Kick off implementation of initial pilot (test) programs

- Initial focus on policy, procedures, training, pilot certification, hardware and software acquisition
- MassDOT Aeronautics Drone Program investigators and Pilot Program participants work together via stakeholder cross-competency technical teams