Unmanned Aerial Vehicles (UAVs) in Delaware

Dwayne Day, Homeland Security Planner, DelDOT

UAVs and DelDOT: How it Began

- Punkin Chunkin 2014
- DJI Phantom 3
- Downlink to Smart Phone


Chuck Snyder / for NewsWorks

Security Concerns

- UAS pose a potential threat to security. Small UAS can be used by criminals and terrorists for espionage, surveillance, and intelligence gathering at critical government and industrial facilities.

- Criminals are also using unmanned aircraft to smuggle drugs and contraband across U.S. borders and over prison walls and fences.

- Somewhat larger UAS could be used to carry out terrorist attacks by serving as platforms to deliver explosives or chemical, biological, radiological, or nuclear weapons. Chemical and biological agents pose a particular concern, as UAS used for aerial pesticide applications could readily serve as platforms to carry out attacks.

- Small UAS could similarly be used to disperse small amounts of certain agents that may be lethal in minute quantities. Even a hoax attack—for example, releasing a powdery substance and making false claims that it contains anthrax virus—could cause widespread panic.

- UAS could also be used as platforms for firearms or other weapons.


16 FT SPRAY SWATH

Drone Caught Delivering Drugs, X-Rated DVDs, Firearm at a High-Security Prison

While many attack scenarios involving UAS may sound far-fetched, most are technically feasible with already-available technology.

Confirmed, planned, or suspected use of small UAVs in support of violent actions

- Homeland Security Advisory Council HSAC is briefed.
- Decision is based to create a UAV Sub-committee to further investigate the use of UAVs in Delaware and keep the HSAC informed.
- Dwayne Day was elected the Chairman of the Committee.

HSAC UAV Committee Membership

- Delaware Department of Transportation
- Delaware State Fire School
- Delaware Department of Agriculture
- University of Delaware
- Delaware State Police
- Delaware Department of Safety and Homeland Security
- Delaware National Guard
- Dover Air Force Base
- Wilmington Police Department
- Private Hobbyist

UAS Committees

- The HSAC UAS Committee splits into three more defined UAS Committees.

1. Delaware UAV Task Force - January 2016
   - Focus was on the Economic Development of UAS into Delaware.

2. UAS Training and Certification Steering committee.
   - Develop a UAS training and certification program for state agency pilots.

3. Homeland Security Advisory Councils UAS committee shifted the focus to the nefarious use of UAS….Counter UAS.

UAS Training and Certification Steering Committee.

UAS Academy out of Virginia provided the initial UAS Training for the committee members.

Membership:

- Delaware Department of Transportation
- Delaware Emergency Management Agency
- Delaware State Police
- Delaware State Fire School
- Wilmington Police Department
- Dover Police Department
- Department of Corrections
- Ocean View Police Department

UAS Training and Certification Committee "Focus"

- The committee focuses on four areas of UAS flying.
  - Maintenance
  - Operations
  - Safety
  - Training

Maintenance, Operation, Safety, and Training (MOST)

- Expands on Federal/State requirements
  - Developing flight training standards
  - Conduct training programs/classes for State Agencies
- State Agency Coordination
  - Mission Collaboration
  - Standards Development
  - Best practices
  - Aircraft troubleshooting

UAS Training and Certification Committee "Focus"

- All Public Agency pilots that are part of the program are trained to the same level.
- All Public Agencies fly the same DJI Operating System Platform.
- This ensures that the pilots and aircraft are interchangeable between agencies.
- A core group of pilots have had additional training from UAS Academy in Tactical Operations and fly together routinely. This has become a small tactical team available for call out by Emergency Managers.

DelDOT Pilot Qualification

Once the pilot has a remote pilot certificate they will have to attend a Pilot Qualification course that teaches basic UAV maneuvers for their particular aircraft.

Before the pilot can have their training records signed off as a Certified UAV pilot they will need to show their ability to fly ten basic maneuvers.

UAV Pilots will have to take a re-exam every 24 months.

UAV Pilots will be required to fly 3 flights within a 90 day period for proficiency.

The DelDOT Qualification Checklist

- UAV Pilot Training and Certification Checklist

☐	Ground School for FAA Remote Pilot Certificate (Optional)	Date:
☐	Pass FAA Unmanned Aircraft General Exam (Required)	Date:
☐	Pilot Qualification Course (Required)	Date:
☐	Tactical Operations Training Course (Optional)	Date:
☐	Indoor Flying Course (Optional)	Date:

Required Maneuvers

☐	Minimum Obstacle Clearance Altitude (MOCA)	Date:	Evaluator Initials:_____
☐	Accuracy Landing	Date:	Evaluator Initials:_____
☐	Complex Figure 8	Date:	Evaluator Initials:_____
☐	Blind Landing	Date:	Evaluator Initials:_____
☐	Road Course	Date:	Evaluator Initials:_____
☐	Point of Interest	Date:	Evaluator Initials:_____
☐	Waypoint	Date:	Evaluator Initials:_____
☐	Reveal	Date:	Evaluator Initials:_____
☐	Standoff Distance	Date:	Evaluator Initials:_____
☐	Long Distance Orientation	Date:	Evaluator Initials:_____
☐	ATTI Mode Flying	Date:	Evaluator Initials:_____

I certify that the above named UAV Pilot has meet all the requirements required by DelDOT's UAV Training and Certification Program and is authorized to fly DelDOT UAVs.

_____ Date:_____

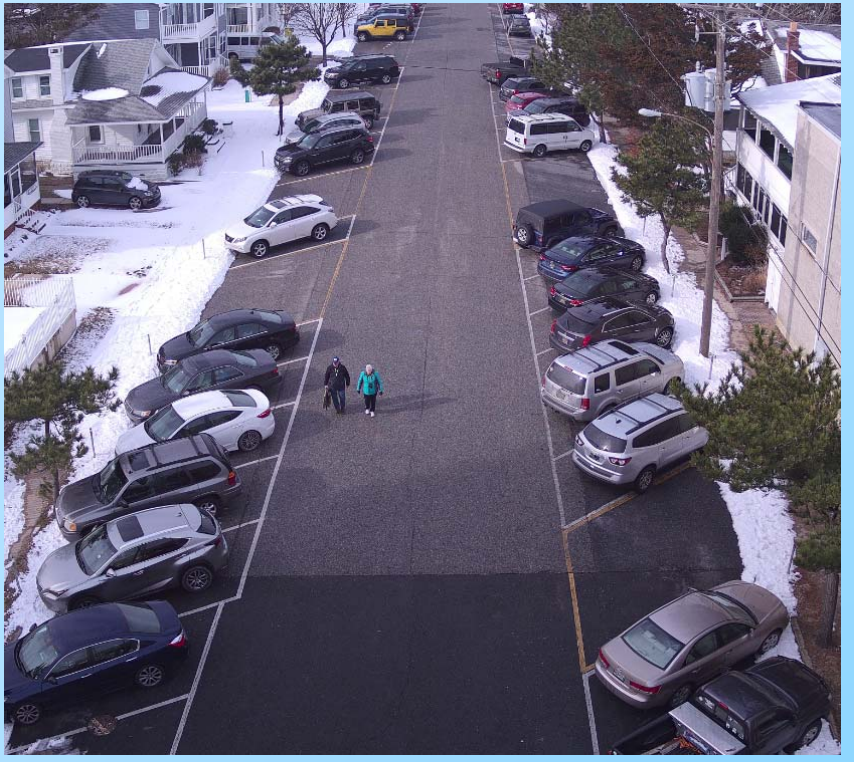
Dwayne Day
DelDOT UAS Program Manager

sUAS Specialized Training

- Tactical Operations – UAS Academy
- Indoor Flying – UAS Academy
- Search & Rescue, FLIR, Night Ops – DartDrones
- Night Flying Qualified – Sundance Media Group (May 2019)
- 8 Pilots are Level 1 Thermography Certified – FLIR
- Drone HAZMAT Course – Magda International (June 2019)

- Every year we try to send UAS Pilots to conferences to learn the latest UAS Technology.
  - AUVSI - 2015
  - National Public Safety UAS Conference - 2016
  - InterDrone - 2017 & 2018
  - AUVSI Exponential 2019

Thermal Imaging



State UAS Training Facility

Pilots are trained on how to fly UAVs at the State Fire School. Courses are taught by members of the Training and Certification Steering committee.

Advance sUAS Pilot Training (Being Developed)

- Based off of the National Fire Protection Association (NFPA) 2400; Standard for Small Unmanned Aircraft Systems (sUAS) for Public Safety Operations.
- Applying the concept of using props while testing the pilots ability to perform aerial maneuvers.

Insurance

- We met with the State Insurance Coverage Administrator and she advised us that drone pilots from state agencies are covered under the state.
- County Public agencies had to get their own insurance policy.
- We had to provide all the registration numbers, pilot licenses, and a copy of the training program.

FAA Registration

- All of our drones are registered under the traditional Aircraft Registration under 14 CFR Part 47.
  - An original Aircraft Registration Application; AC Form 8050-1
  - A Notarized Affidavit; AC Form 8050-88
  - A copy of the original receipt.
  - No charge for Government (State) agencies.

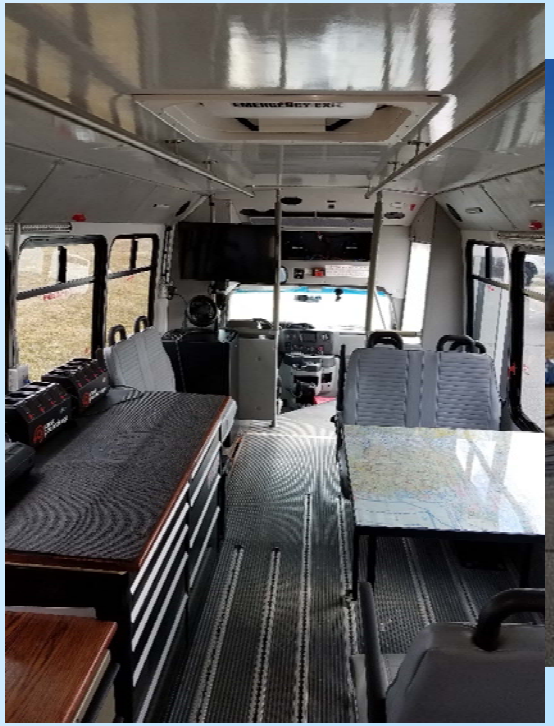
  - Send everything to Oklahoma City and wait about 6 weeks for your registration and N-number.
  - You can still fly your drone as long as you have a copy of your registration application with you.

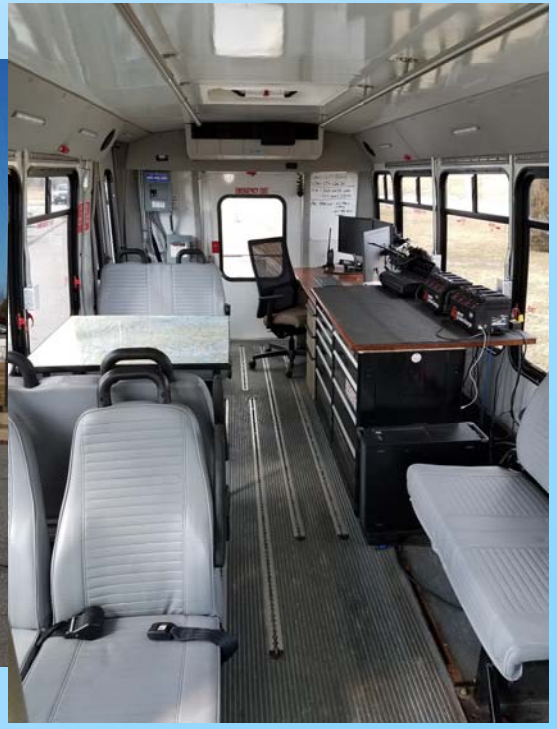
Consolidated Missions

- Vaughn Prison Hostage Take-Over – February, 2017
  - Wilmington PD, Delaware State Police, DelDOT, DEMA, and Dover PD pilots
- Wilmington Hostage situation – March, 2017
  - Wilmington PD and Dover PD pilots.
- Trooper Shooting, Gunman barricaded – May, 2017
  - Wilmington PD, Delaware State Police pilots and New Castle County Police as Visual Observers.

DelDOT Drone Bus

- Video downlink capability into the Transportation Management Center.
- Mobile TMC is used for long duration UAS operations





DelDOT's UAV Program

DelDOT UAV Operational Policy

DelDOT has developed an UAV Operating Policy for flying UAVs that identifies;

1) Program Oversight along with Operational Directives
2) Division Participation
3) Equipment
4) Training & Certification,
5) Flight Planning & Operations.

All UAS missions whether they are flown by DelDOT or a hired contractor, if flying on a DelDOT project require a pre-flight plan to be filed with the TMC in advance of the mission.

The policy requires a two-manned approach with a pilot and visual observer for each flight, even though the FAA 107 rule only requires a pilot.

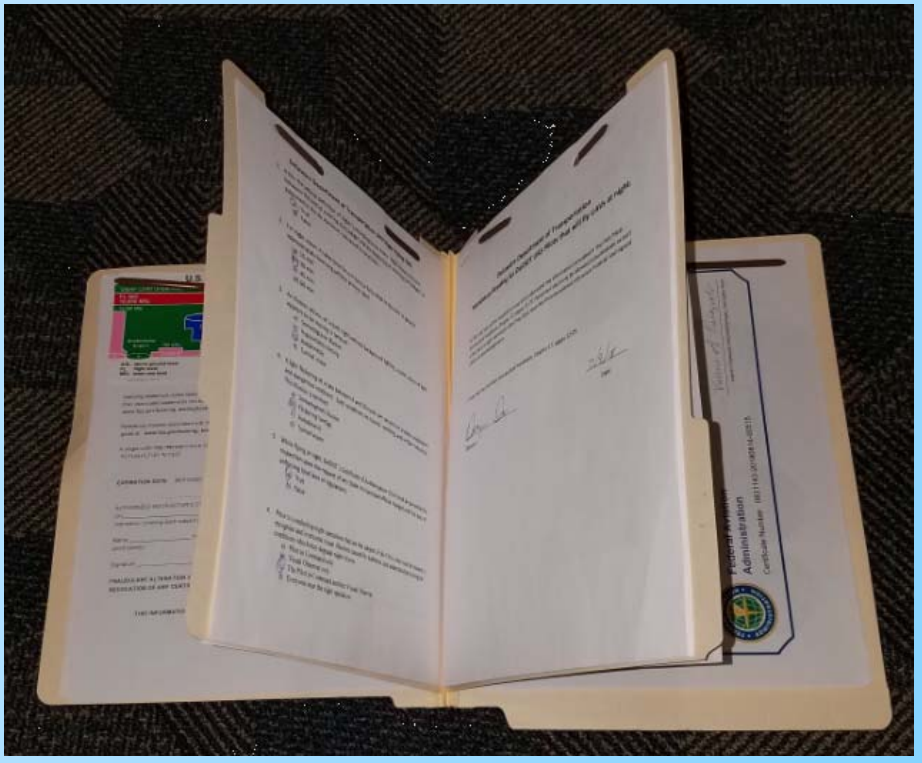
DelDOT sUAV Pilots

Nine DelDOT FAA 107 Pilots.

- District Engineer (M&O)
- Surveyor (M&O)
- Project Manager (M&O) (Commercial Pilot)
- Safety Officer (Traffic)
- Special Events Manager (Traffic)
- Assistant Director (Finance) (Female)
- Homeland Security Planner (UAS Program Manager)
- TMC Supervisor
- Right of Way Agent

DelDOT Training Records

- All DelDOT Pilots have a training record.
- UAV Mandatory Reading for Night Flying
- UAV Pilot Training and Certification Checklist
- DelDOT Pilot Application
- FAA test results
- UAV Night Flying Quiz
- UAV Training Certificates



DelDOT sUAS Inventory

• DJI Inspire 1 Pro	4
• DJI Phantom 4 Pro	5
• DJI Mavic Air	1
• DJI Mavic Pro	1
• DJI Mavic 2 Enterprise	3
• DJI M210	3
Total	16

Different tools in the tool box

DelDOT sUAS Inventory…Cont.

- Primary drones used
  - DJI Phantom 4 Pro

  - DJI M210
    - 30X Zoom Camera
    - Thermal Camera

FAA Waivers

January 2016 - 1st Certificate of Authorization (COA)

June 2016 - FAA released Part 107

Government agencies have two options for operating drones under 55 pounds.

1. Fly under 14 CFR part 107.
2. Operate with a Certificate of Waiver or Authorization (COA) to be able to self-certify UAS and operators for flights performing governmental functions. (A FAA Remote Pilots License meets this requirement)

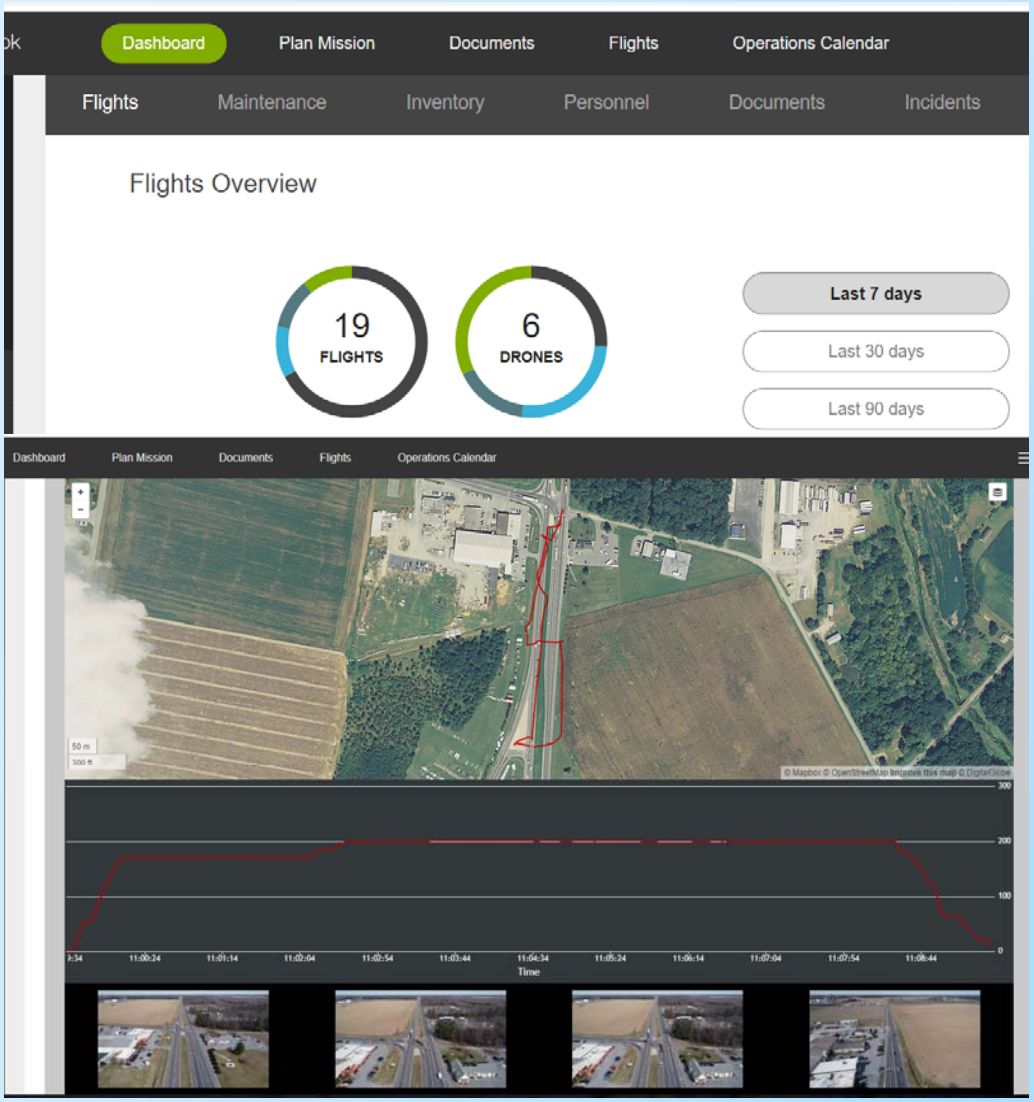
April 2018 – 2nd Certificate of Authorization (COA)

Fly within Class D airspace at ILG and KDOV

April 2018 – 107 Waiver for Night Operations

August 2018 – 107 Waiver for Class D airspace around Dover AFB

Drone LogBook



Operations Report
08 March 2019

Delaware Department of Transportation
169 Brickstore Landing Rd

Period: 2019-02-01 to 2019-03-08
Name: Dwayne Day **Email:** dwayne.day@state.de.us

FLIGHTS for : Dwayne Day as Pilot

Total flying time for this pilot: 03:05:57

Date	Flight name	Drone	Duration	Location
2019-03-07 09:50:51 14:50:51 UTC	**Flight 2019-03-07** **09:50:51**	TMC - N808WL DJI/Phantom 4 Pro	00:02:43	US 301 Toll, New Castle County US 301 Toll Delaware 19709 US (39.425684440505, -75.76264151274)
Landing Time:14:53:34 UTC **Flight Type:** Commercial - Photo/Video				
Operation Type: VLOS **Sunset / Sunrise:** Day **Personnel:** Dwayne Day [Pilot], Richard Christopher Marsh [Visual Observer] **Pilot info:** **Equipment onboard:** B13 **Nb landing:** 1 **Distance:** 761.15 feet **Max altitude:** 226.38 feet **Conditions:** **Cloud cover:** 100 % **Temperature:** 32 F **Wind:** 8.79 miles/hour (270°) **Humidity:** 45 % **Notes:**				
IGC File			KML File	

Date	Flight name	Drone	Duration	Location
2019-03-01 01:41:20 06:41:20 UTC	**Flight 2019-03-01** **01:41:20**	TMC - N862QG DJI/Matrice 210	00:08:53	TMC 169 Brick Store Landing Road Smyrna DE 19977 US (39.31867281396407, -75.60641126848742)
Landing Time:06:50:13 UTC **Flight Type:** Test Flight				
Operation Type: VLOS **Sunset / Sunrise:** Night **Personnel:** Dwayne Day [Pilot], Richard Christopher Marsh [Visual Observer] **Pilot info:** **Equipment onboard:** XT2 (TMC), TMC 1 B, TMC 1 A **Nb landing:** 1 **Distance:** 1837.27 feet **Max altitude:** 190.29 feet **Conditions:** **Cloud cover:** 100 % **Temperature:** 35 F **Wind:** 4.43 miles/hour (93°) **Humidity:** 60 % **Notes:**				
IGC File			KML File	

Date	Flight name	Drone	Duration	Location
2019-02-21 15:52:25 20:52:25 UTC	**Flight 2019-02-21** **15:52:25**	TMC - N862QG DJI/Matrice 210	00:03:28	TMC 169 Brick Store Landing Road Smyrna DE 19977 US (39.31867281396407, -75.60641126848742)
Landing Time:20:55:53 UTC **Flight Type:** Test Flight				
Operation Type: VLOS **Sunset / Sunrise:** Day **Personnel:** Dwayne Day [Pilot], Zachary Lawson [Visual Observer] **Pilot info:** **Equipment onboard:** TMC 4 B, TMC 4 A, Z30 (TMC) **Nb landing:** 1 **Distance:** 4215.88 feet **Max altitude:** 187.01 feet **Conditions:** **Cloud cover:** 0 % **Temperature:** 53 F **Wind:** 6.34 miles/hour (298°) **Humidity:** 54 % **Notes:**				
IGC File			KML File	

Funding

Training courses were paid for through the Homeland Security grant. Approximately $80K

Drones were bought by DelDOT through various funding streams.

- State Funds
- Special Event Funds
- State Transportation Innovation Councils (STIC) Funds 80/20

Modifications on the Drone bus were done in-house by DelDOT employees.

Thermal cameras and Zoom cameras were purchased through the Homeland Security grant.

Video and Photo Processing

- Your going to think you are taking fantastic videos…reality is your first couple of videos will probably make someone motion sick.
- We use Adobe Premiere 15 to process the videos.
- Only about 3 pictures can be sent through the state email system. No videos, they are much too large.
- We have used Drop Box, flash drives, SD cards, in-house drives on our servers.
- IT folks might get upset with the amount of space that you will use to save your videos.

Uses for DelDOT

- Situational Awareness
- Debris Assessments
- Traffic Mitigation
- Bridge Inspections
- Aerial photography of traffic projects
- Archeological inspections/photos

Royal Farms in Milford, Rt. 1

Route 1 & 16 Intersection

2016.11.16

SR 1 AT SR 16 BRIDGE RENDERING

WRA

Delaware Department of Transportation

SR 1 AND SR 16 GRADE SEPARATED INTERSECTION

DelDOT

Firefly Festival Lot 18…Tent Campers

Tanker Rollover Rt 1

Future DelDOT UAVs

Tethered Drones

Unmanned Maritime Drones

Questions or Comments

Delaware Department of Transportation (DelDOT)

Dwayne Day

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