MassDOT Drainage Mapping Guide

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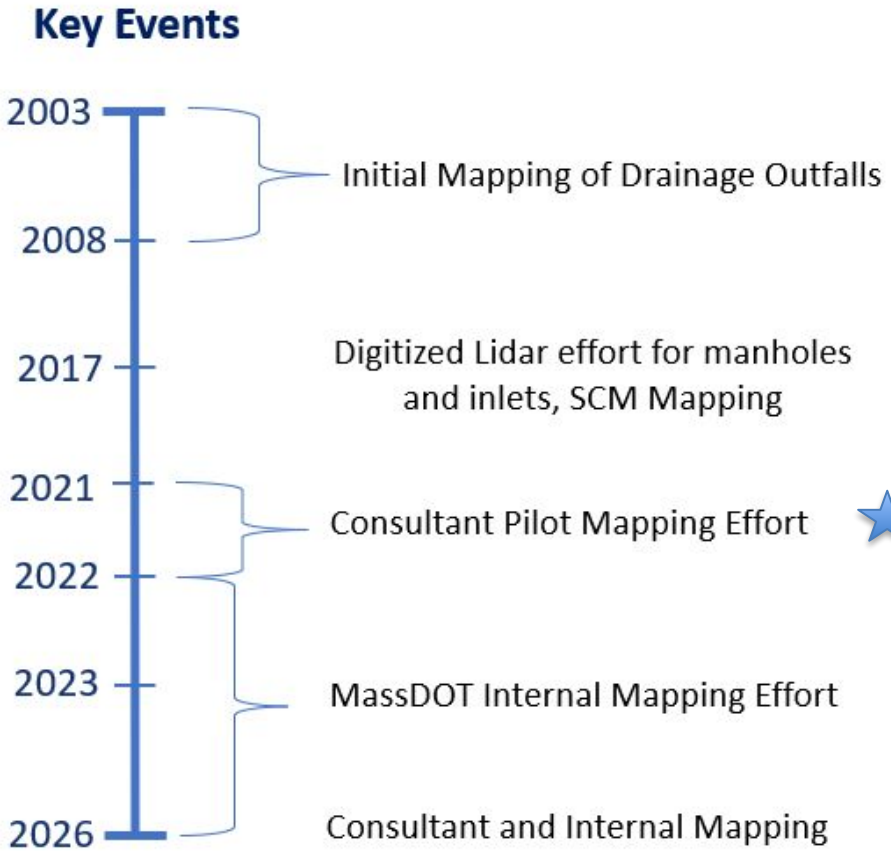
Agenda

- Purpose and Needs
- History of Drainage Mapping Effort
  - Pilot (consultant) Mapping Effort
  - Internal Mapping
- Drainage Mapping Guide Overview
- Lessons Learned

Purpose and Needs

- Asset Management
- Operations & Maintenance Tracking
- Resiliency
- Spill Response
- EPA MS4 Permit Compliance
- TMDL Water Quality Tracking

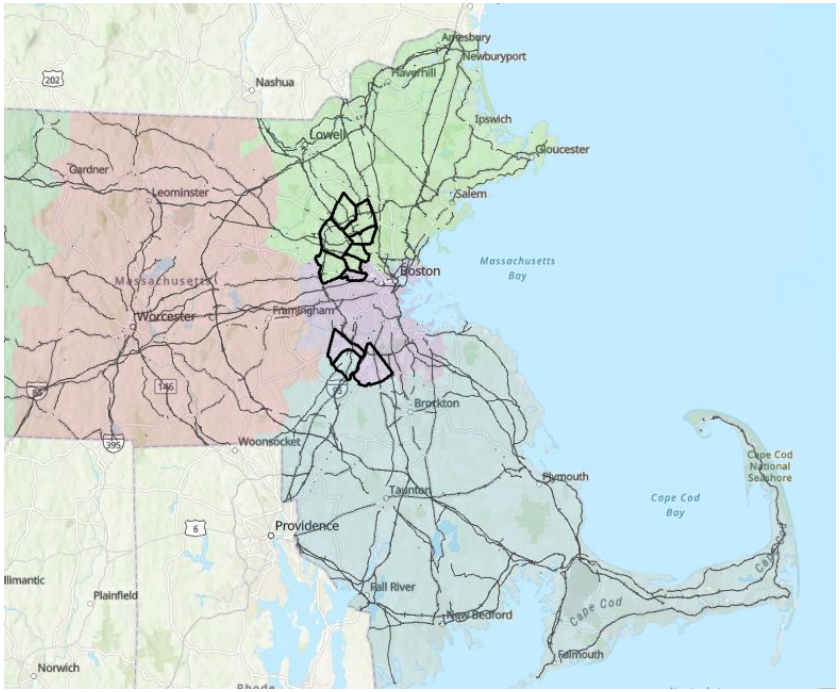
History of Drainage Mapping Effort



★ Guide developed!

Pilot Mapping Effort

- Pilot mapping 2021-2022
  - 4 consultants, 11 towns
  - Desktop digitizing and field mapping
  - ~400 miles mapped



- Waltham
- Arlington
- Westwood
- Canton
- Winchester
- Belmont
- Watertown
- Norwood
- Woburn
- Burlington

Internal Mapping Effort

- Internal (MassDOT) staff mapping 2022-present
- Team of up to 4-8 part time mappers at any given time
  - Entry level
  - Co-ops
  - Interns (georeferencing)
- Third party QA/QC
- ~350 miles mapped

Drainage Mapping Guide Overview

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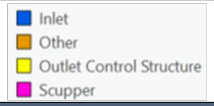
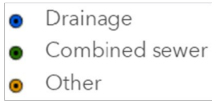
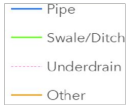
Drainage Mapping Guide Overview

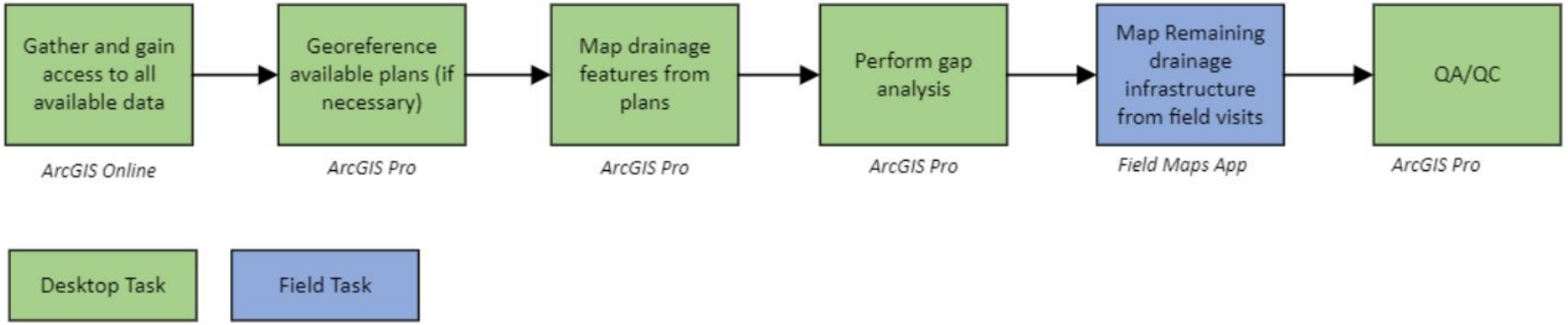
Related Tables:

- Conveyance Inspection Form
- Inlet Inspection Form
- Manhole Inspection Form
- SCM Inspection Form
- Stormwater Discharge Point Inspection Form
- Misc Structure Inspection Form

Feature Classes:

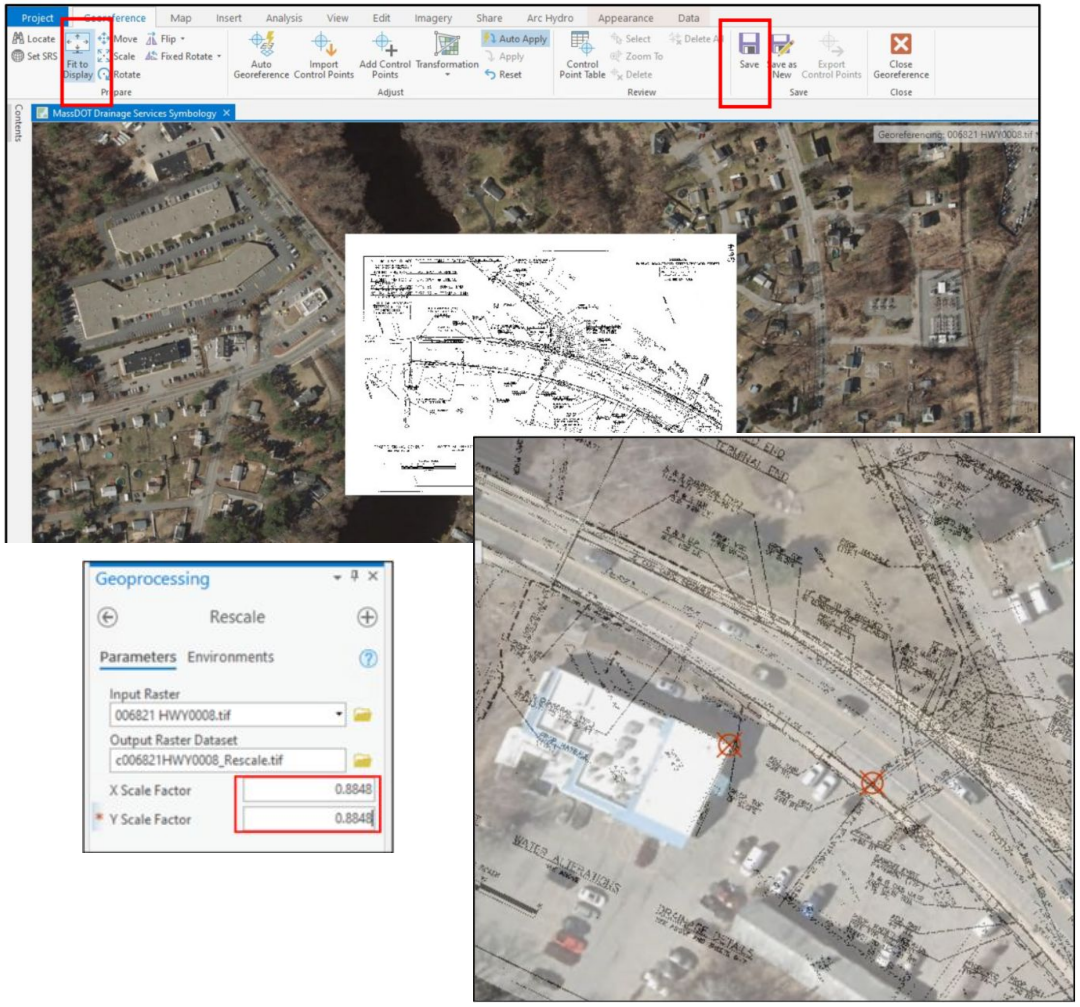
Stormwater Discharge Points	
	• Locations where stormwater exists a stormwater system. • Point are typically found at the end of closed conveyances.
Inlets	
	• Locations where stormwater runoff enters a stormwater conveyance.
Manholes	
	• Identifies locations of manholes, often located where closed conveyance systems come together or change direction.
Stormwater Control Measures	
	• Identifies any practice or facility that improves, retains or manages stormwater.
Conveyance	
	• Identifies the conveyance or flow paths of stormwater.
Miscellaneous	
	• Identifies miscellaneous stormwater assets that do not fall within the description of other feature classes.
Interconnections	
	• Identifies locations MassDOT and another MS4 system interconnect.

MassDOT Mapping Approach



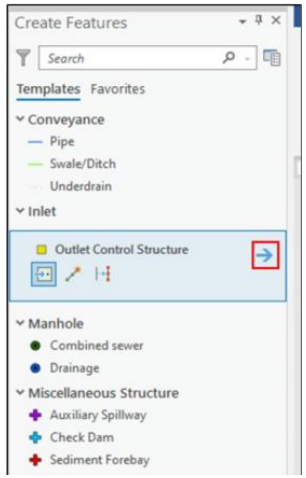
Desktop Mapping - Georeferencing

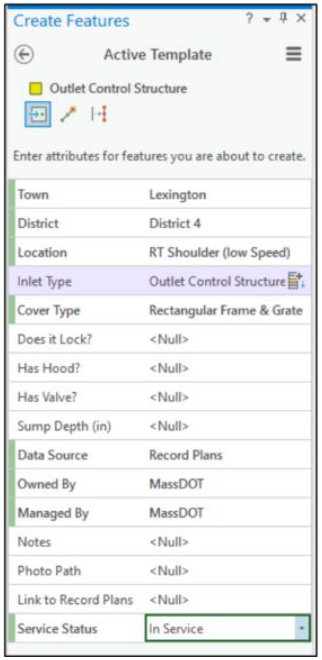
- Importing Plans into ArcGIS Pro
- Georeferencing using:
  - Rescale tool
  - Control Points



Desktop Mapping - Digitization

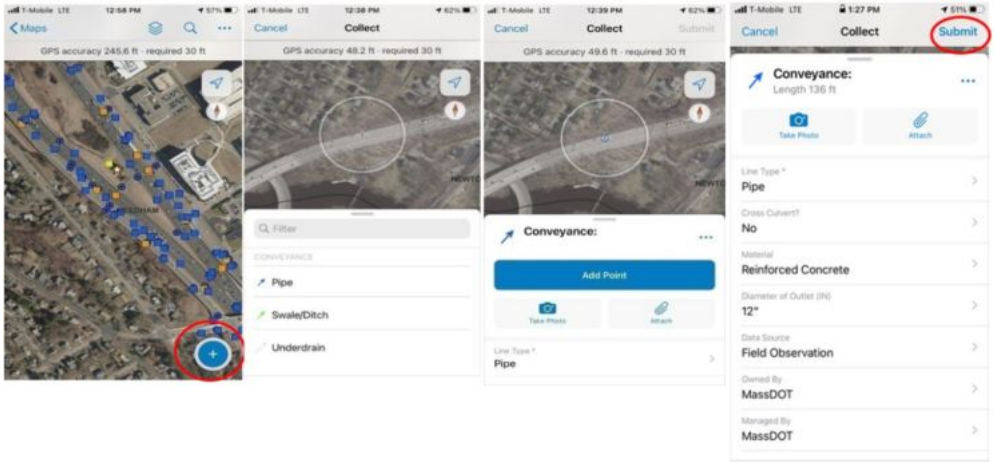
- Step by step instructions on how to:
  - Start creating feature
  - Create geometry
  - Include attribute information
  - Update existing features
- Reviews best practices:
  - Snapping
  - Flow direction
  - Assigning correct coordinate systems
  - etc





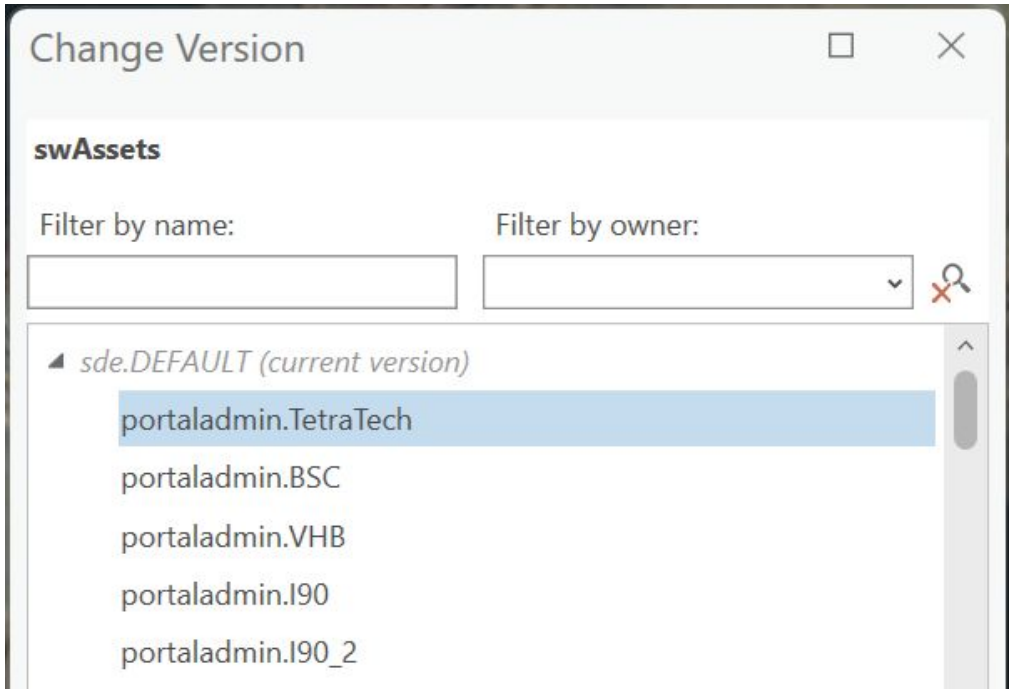
Field Mapping Approach

- Field Maps App
  - Updating existing data
  - Creating new data in field
  - Creating inspection records



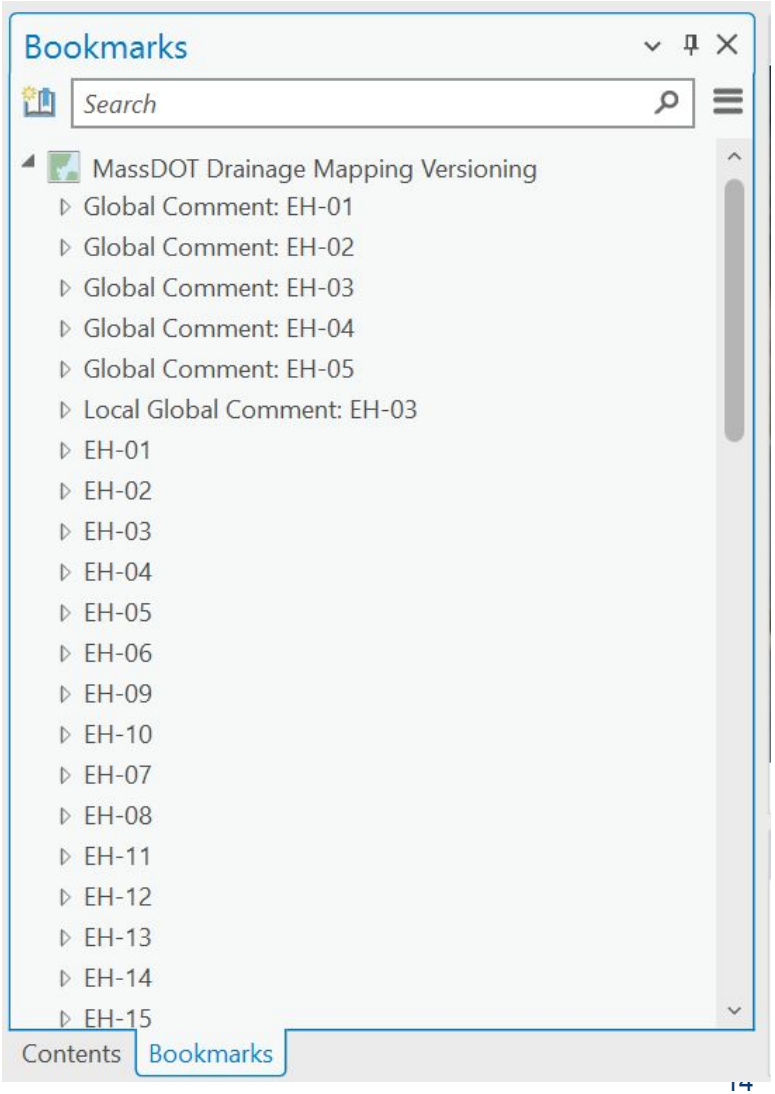
Quality Control - Versioning

- **Versioning** allows editors to work isolated within their own version of the geodatabase and across multiple edit sessions
- This allows review of the data before it is published to the final geodatabase



Quality Control – Review Process

- ✔ Mapper performs self review
- ✔ Mapper notifies Reviewer
- ✔ Reviewer performs review
- ✔ Reviewer sends comments via bookmarks
- ✔ Mapper addresses comments via bookmarks
- ✔ Back checks done as necessary
- ✔ Reviewer “reconciles” and “posts” version to database



Appendix A: Database Organization

- Roadmap to how to structure your database (fields and domains)

Inlets

Inlets					
Alias	**Type**	**Source**	**Domain**	**Description**	**Length**
Asset ID	TEXT	Auto (MassDOT)		Unique MassDOT identifier generated when a new feature is created.	20
Associated SCM ID	TEXT	Mapping Professional		Unique MassDOT identifier for the SCM with which the feature is associated (if applicable).	20
Town	TEXT	Auto (MassDOT)		Name of the Massachusetts Town the feature is located within.	50
District	TEXT	Auto (MassDOT)	District	Name of the MassDOT highway district the feature is located within.	10
Road	TEXT	MassDOT		These fields will be populated as part of the Programmatic Operations and Maintenance Plan.	255
Roadway Type	TEXT	MassDOT	POMP _RoadwayType	These fields will be populated as part of the Programmatic Operations and Maintenance Plan.	255
Location*	TEXT	Mapping Professional	Location	Approximate location description of structure relative to roadway (e.g., lane number, shoulder, median, sidewalk etc.)	25

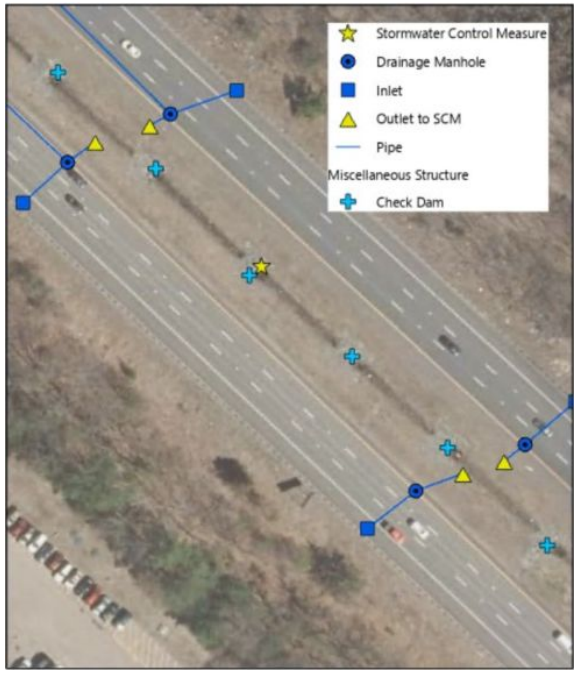
List of Domains

Domain Name	Data Type	Domain Type	Coded Value	Coded Value Description
Action	TEXT	CODED	None Inspection Repair Cleaning Replacement Inspection and Cleaning	None Inspection Repair Cleaning Replacement Inspection and Cleaning
Condition_1	TEXT	CODED	Good – inspect within 2 years Fair - inspect within 1 year Poor – requires maintenance Failing –requires immediate action	Good – inspect within 2 years Fair - inspect within 1 year Poor – requires maintenance Failing –requires immediate action
DataSource	TEXT	CODED	Field Observation External Data Source Lidar Digitized 2017 Record Plans	Field Observation External Data Source Lidar Digitized 2017 Record Plans

Appendix B: Example Mapping Scenarios

How to map…

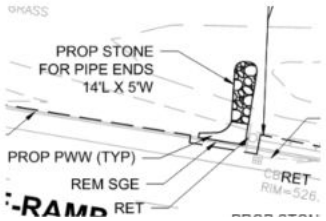
Swale with Check Dams



Stormwater Control Measures

Paved Waterways

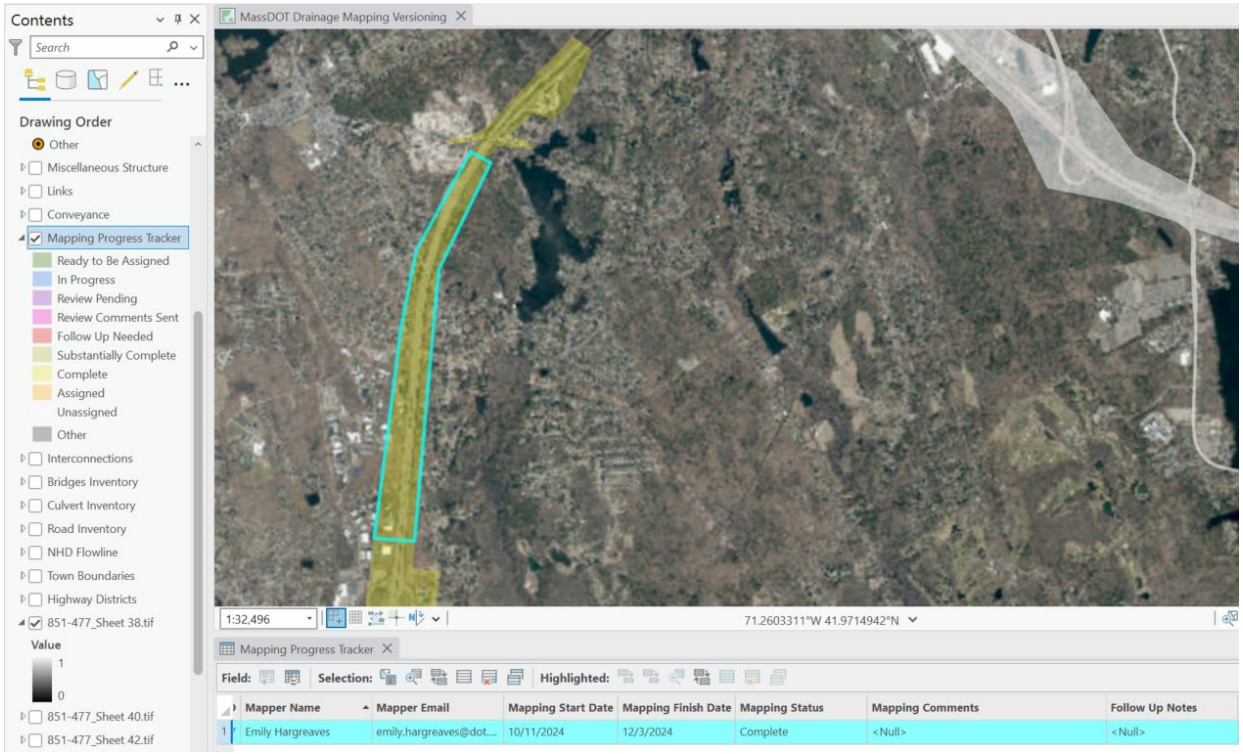
Figure 69



…and more!

Mapping Progress Tracker

- Polygon layer that tracks mapping assignments spatially
- Also allows for mappers/reviewers to “tag” the status of their review/mapping



Lessons Learned

- Prioritize desktop mapping over field mapping
- Track progress early and often – build a system
- QA/QC takes longer than you think
- Plan sorting is time consuming but essential
- Don’t reinvent the wheel – adapt our guide for your own use!
  - If you do make your own guide – adapt as necessary

Thank you!

For a Copy of the Guide or Other Questions Please Contact:

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MassDOT Stormwater Unit Webpage:
https://www.mass.gov/info-details/stormwater-management-unit