USING ARCGIS TO REVITALIZE MASSDOT DATA PROCESSES

QUINN MOLLOY
GIS MUNICIPAL COORDINATOR
MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
MASSDOT GIS SERVICES

• About GIS Services
  – In the Office of Transportation Planning
  – Managed by Kevin Lopes

• Primary function is to maintain the Road Inventory, submit data to HPMS (the federal Highway Performance Monitoring System)

• Current Services:
  – Collect, organize, & maintain data
  – Assist in data analysis
  – Develop custom applications

• Goals:
  – Increase the quality of our data
  – Improve local/regional partner access to GIS for transportation
  – Build custom tools to improve workflows and asset management
ESRI ROADS AND HIGHWAY

- Esri tool suite built to manage highway and road data using an LRS
  - Linear Referencing System (LRS):
    - Geometric network with attribute data overlaid as events
    - Allowed us to build a complex data matrix without static and cumbersome feature classes
  - Benefits
    - SDE editing environment
    - Quality control through update tracking
    - Full platform integration
ROAD INVENTORY FILE UPDATES

• Process Revitalization
  – Old process:
    • Redundant work flows
    • Lack of tracking, accountability
    • Outreach effort went largely ignored
  – New components:
    • Digital interface
    • Robust annual reporting tools
    • Ability to make frequent edits
    • Customizable tools
• Provide new tools and workflows to municipal and regional entities

• Eventually hope to allow municipalities to be completely in control of their own data updates with state oversight

• Municipal entities have a more complete knowledge of local conditions and changes than state employees
NEW WORKFLOW

1. Custom document interface with download
2. Road Characteristic Editor
3. On-screen digitizing with document upload
4. “Red-Line” editing
5. LRS integration effort

Can result in a higher municipal Ch. 90 funding
DATA DEVELOPMENT

Benefits

- SDE editing environment
  - Multiple users editing the same files
- Breaking down data silos
  - Improves quality of information
- Makes data sources more accessible
- Allows for more consistent maintenance

Data Structure

- MassDOT Cloud Servers Web Services
- ESRI Cloud ArcGIS Online (geoDOT)
- Editing Apps
- Collector Apps
- Analysis Apps

Silo Example

```
<table>
<thead>
<tr>
<th>Highway</th>
<th>Environmental</th>
<th>Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pavement</td>
<td>Pavement</td>
<td>Pavement</td>
</tr>
</tbody>
</table>
```
MIGRATING TO DIGITAL DOCUMENTATION

TRACKING TOOL DEVELOPMENT

KEY POINTS

- Promotes accountability

- Building online interface for municipal reporting

- Back-logging +30 years of road update information to allow for an accessible and searchable database
CREATE TOOLS TO INCREASE PUBLIC/LOCAL PARTICIPATION

TYPES OF TOOLS IN DEV

• Data, communication, & update tracking
• Analysis and planning tools
• Summary tools to create downloadable tables
• Data dashboards for easy visualization and metric comparison
• Street-viewers for facility expansion

Welcome to the Road Inventory Municipal Data Viewer!
To get started, follow the instructions below:
1. Select a municipality from the drop down list.
2. Choose a street selection option:
   i. Single Street - to view road segments of a single street within a municipality.
   ii. All Streets - to view all road segments within a municipality.
   iii. Ownership - to view mileage counts by Jurisdiction within a municipality.
   iv. Functional Classification - to view mileage counts by Functional Classification within a municipality.
   v. Federal Functional Classification - to view mileage counts by Federal Functional Classification within a municipality.
   vi. NRS Status - to view mileage counts by NRS Status within a municipality.
   vii. Federal Aid - to view mileage counts by Federal Aid eligibility within a municipality.

<table>
<thead>
<tr>
<th>Street Name</th>
<th>City/Town Accepted</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALDEN ROAD</td>
<td>0.063</td>
</tr>
<tr>
<td>ALLEN STREET</td>
<td>0.253</td>
</tr>
<tr>
<td>ANDYS COURT</td>
<td>0.15</td>
</tr>
<tr>
<td>ANGORA AVENUE</td>
<td>0.147</td>
</tr>
<tr>
<td>ANSEL WHITE DRIVE</td>
<td>0.468</td>
</tr>
</tbody>
</table>

gis.massdot.state.ma.us/dataviewers/rimunicipal
• Analysis Goals
  – Provide MassDOT and local partners tools/workflows to make spatial, data-driven decisions
  – Leverage Insights and similar tools to create a network of data exploration and development tools
  – We plan to start using it this summer

Features:
- Data downloads
- eMap building
- Custom tools, applications
- Interactive Maps
- Physical Map downloads
- Historical Map database
- Data collection and sharing tools
GEODOT LOCAL

• What is it?
  – A digital portal for local data development, GIS-T, and state interaction
  – A separate ArcGIS Online Organizational account from geoDOT, MassDOT’s general AGOL portal

• Stakeholders:
  – MassDOT GIS
  – Municipalities
  – RPAs
  – MPOs

massmpos.maps.arcgis.com
OPEN DATA

Welcome to the "NEW" MassDOT Open Data Portal!
Use the search bar above to download Open Datasets in some of the most useful formats for spatial analysis and web integration.

Available Download Formats
- SHP: Esri shapefiles often used by GIS professionals and academics while working with Esri products or compatible desktop software.
- XML: Extensible Markup Language files are written in an easily read markup language commonly used to display meta data (data about data).
- CSV: Comma Separated Value text files display tabular data in a plain-text or spreadsheet format and can be easily read by assistive technology.

Features:
- Live data exploration tools, visualizations
- Filtered and dynamic data downloads
- API integration for web developers

geo.massdot.opendata.arcgis.com
PICTOMETRY ACCESS

• Easily Accessed through GeoDOT Local
• Has the latest available imagery for each region of the state (ranges from 2008-2014)
• Licensing available for any local gvt
• Address search functionality

explorer.pictometry.com
GIS users can work with GIS staff of get creative on their own to develop applications that best suit their needs.

Current Projects
- Pedestrian Inventory Data Development
- Bicycle Inventory Data Development
- CIP Story Map
- End Treatments Inspection Collector App
- Potholes Dashboard
- Traffic Count Locations Collector App
- VMT Self-Service App
- Curb Ramps Collector App
- MS2 Traffic Integration with Roads and Highways
- Rail Inventory LRS in Roads and Highways
HIGHWAY PROJECT INTAKE TOOL

https://trdept-ms.esri.com/mapit/
CURRENT STATUS AND GOALS

– Rolling timeline
  • Release products as we complete them
  • Currently working to build out each RIF attribute workflow

– GeoDOT Workspace
  • Will gradually have more functionality
  • Developing tools based on local partner feedback
  • MassDOT sends out periodic update reports

– Goals
  • Increase digital documentation
  • Improve data
  • Track updates
  • Empower users