



DYE MANAGEMENT GROUP, INC.



## Data Knowledge and Knowing What To Do Next

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# Objectives

- **Session** - Explore ways that data have been collected, managed, and visualized
- **Presentation** - Focus on two examples:
  - Guardrail end treatments at MassDOT
  - Remote data collection at Michigan DOT



# MassDOT TAM Implementation

- Project goal: Implement Transportation Asset Management (as defined in Strategic Plan) across MassDOT
- How?
  - Divide tasks from plan among technical working groups (TWGs) to implement the plan
- DMG involved with two TWGs:
  - Inventory and Asset Data
  - Maintenance
- Cross-section of DOT, with representatives from: Pavement, IT, Bridge, Maintenance, Environmental



# MassDOT TAM Implementation

- Proof-of-Concept: Guardrail end treatments
- Maintenance TWG
  - Defined standard definitions and units of measure regarding the maintenance of guardrail end treatments
- Inventory and Asset Data TWG
  - Drafted detailed document defining what type of information should be collected for end treatments



# MassDOT TAM Implementation

- People from across the agency have different relationships with guardrail end treatments (ETs):
  - Construction → Constructs ETs
  - Districts → Design ET projects
  - Motorists and plows → Damage ETs (accidentally)
  - Accident recovery consultants → Fix ETs



# MassDOT TAM Implementation

- Data collection challenges and questions:
  - What should the numbering system be for ETs?
  - Two important considerations for ETs: equipment-type (ET model) and location. However, both can change over time. How to address?
  - Spatial data: What if ET is installed three feet from the one it replaced? Is it a “new” ET?
  - Inspections: how often? Are all ETs inspected with same frequency or are ETs on higher-traffic roads inspected more frequently?



# Lesson Learned

- MassDOT
  - Collecting and obtaining asset data is not enough; only valuable if it is usable to the consumer
  - Face-to-face conversations with staff from across the agency result in valuable discussions and outcomes/decisions
    - e.g., Inventory Proof-of-Concept document



# Next Steps

- MassDOT
  - TWGs met three times
  - Final work product was a three-year plan
    - How to work toward the goals defined by the Strategic Plan
  - Plan serves as a guide
  - It is up to the TWG members to maintain momentum





# Michigan DOT



## Issue

- How useful and feasible is inventory collection through remote sensing?



## Research

- Compared remote sensing data collection options and manual data collection



## Outcome

- A more complete and accurate asset inventory to share with data consumers, research agencies, local gov't, and MPOs



# Michigan DOT

## Project Goals

- Reduce reliance on field staff for monitoring roadway assets; minimize worker exposure
- Prioritize which assets are feasible for monitoring with remote technology
- Identify tools and establish processes for collecting, storing, analyzing, sharing, and updating attributes of roadway assets



## Project Approach

- Literature review
- Pilot study
  - LiDAR, aerial photography, photo-logging (mobile imaging), video-logging, manual data collection
- Recommendations for implementation
  - Costs, software and data storage requirements, data sharing opportunities, and anticipated results



# Michigan DOT

## Asset Prioritization Approach:

- 27 roadway assets
- Asset prioritization metrics
  - Quantity and dollar value of the asset category relative to that of the entire asset population
  - Importance of the asset category to the agency and road users
    - Safety, congestion, and environmental impacts
  - Relative cost of the data collection for each asset within the technology
  - Frequency of required data collection for the asset category



# Michigan DOT

Metric	Importance Level	Score	Weight
1. What percentage of the total maintenance budget is spent maintaining the asset?	Not important (less than 0.5%)	1	30%
	Somewhat important (0.5%-5%)	2	
	Moderately important (2%-4%)	3	
	Important (4%-8%)	4	
	Very important (greater than 8%)	5	
2. What is the importance of the asset category to the agency and road users?	Not important to majority of users	1	25%
	Somewhat important	2	
	Moderately important	3	
	Important	4	
	Very important	5	
3. What is the relative cost of remote data collection for each asset within the technology?	Greater than 110%	1	25%
	105%-110%	2	
	85%-105%	3	
	70%-85%	4	
	Less than 70%	5	
4. How frequently will data for this asset category need to be collected?	Very infrequently (e.g., five to ten years)	1	20%
	Infrequently (e.g., two to five years)	2	
	Annually	3	
	Frequently (e.g., quarterly)	4	
	Very frequently (e.g., monthly)	5	
TOTAL			100%



# Michigan DOT

Asset Group	Asset Category	Scores for Each Metric					Priority Rating		
		1	2	3	4	Weighted Average	High 3.01- 5.0	Medium 2.01-3.0	Low <=2.0
Roadway	Total lane miles	5	4	5	4	4.55	X		
	Concrete surface lane miles	3	4	5	4	3.95	X		
	Bituminous surface lane miles	5	4	4	4	4.3	X		
	A miles (map miles)	5	4	4	4	4.3	X		
Roadside	Paved shoulder miles	3	3	3	1	2.6		X	
	Gravel shoulder miles	4	3	3	1	2.9		X	
	Curb miles	2	2	3	2	2.25		X	
	Number of sweepable approaches	3	3	2	3	2.75		X	
	Lineal feet of guardrail	3	3	3	4	3.2	X		
	Number of guardrail endings	1	4	4	4	3.1	X		



## Project Outcomes

- Evaluation of inventory data collection methods
- Cost estimates to gather inventory data
- Data storage requirements
- Data sharing opportunities and strategies
- Implementation plan
  - Prioritization of assets, recommended data collection method, frequency of collection, and processes and responsibilities for updating inventories



# Lessons Learned

- Michigan DOT
  - Include multiple divisions and regions within the department early in the project
    - Helps establish priorities for roadway asset categories
    - Provides an opportunities to maximize the utilization of inventory data
  - Important to clearly define highway assets
    - How does an agency inventory signs (sign structure, number of faces, square feet, etc.)?
    - Where should guardrail measurement start/stop when asset continues around an intersection corner?
    - How does an agency determine mowable area?





# Next Steps

- Michigan DOT
  - Develop department-wide policies for updating and maintaining asset inventories
  - Develop RFP for statewide implementation
  - Utilize sampling approach for manual culvert inventory collection



# Conclusions

- Data is only valuable if it is usable to the consumer
- Include multiple divisions and regions within the department early in the project
- Face-to-face conversations with staff from across the agency, while difficult to schedule, result in valuable discussions and outcomes/decisions



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