## MDOT Transportation Asset Management System (TAMS)

No Boundaries Roadway Maintenance Practices Pooled Fund Meeting

August 30th, 2017

Columbus, Ohio



Todd Rowley

Transportation Maintenance Coordinator Justin Droste PE Asset Management Engineer MDOT Operations Field Services



## MDOT Transportation Asset Management System (TAMS)

What are the initial goals? 2015

- Electronic work order system
- Asset Management Data
- Sign Inventory







a which which wanted



"TAM Systems are the vendor tools that will be utilized by combining spatial information (across multiple linear referencing systems (LRS) with business *intelligence* to achieve the objectives of **Enterprise Asset Management. TAM** Systems also integrate information from other MDOT data systems and applications"

Enterprise Asset Management MDOT



 Awarded Contract to Data Transfer Solutions, LLC July 13, 2015



- Contract is for 7 years with options for 5 additional years.
- Key Components:
  - Road Network Management (linear referencing)
  - Asset Inventory Management
  - Maintenance Management
  - Future Integration Capability

### **Contract Overview**



- Project Management: Department
   Technology Management and
   Budget (DTMB) (Michigan IT agency)
- MDOT Business Owners:
  - Bureau of Field Services
  - Bureau of Development
  - Bureau of Transportation Planning
- Subject Matter Experts:
  - Asset experts
  - Data system experts

#### End Users

- Central Office (statewide)
- Regions/TSCs (Maintenance, Design, Construction)
- MDOT Garages
- Contract Agencies & private contractors





### **Project Execution**



# Maintenance Management System (MMS)



- Asset functions (Road Asset Inventory, Signs, Culverts, Guardrail)
- Linear referencing functionality
  - ESRI Roads & Highways
  - Straight Line Diagram tool
- Data Interfaces (1-way communication)
  - Global, MIDB, PDRP, M5, Stores, MIBridge, SDE
- Support <u>Performance Based</u> <u>Maintenance functions.</u>

**\*** GIS Centered Functions

### **Phase 1 Priorities**







#### Service Request & Work Order Functions

- Plan/track/report activities
  - Locations
  - Costs
  - Quantities
- Supervisors can schedule work and resources
- Reporting capability
- Integrate w/ existing MDOT systems
- Budget planning and Asset Association







#### **Maintenance Management System (MMS)**



#### Vendor Tools

- Vueworks
- Mobilevue
- Road Analyzer
- ESRI Roads and Highways tools
- Transcend
   Productivity
   tools

#### Spatial Asset Info

- Culverts (1-10')
- Guardrail
- Cable Barrier
- Signs (5 classes)
- Road Asset inventory (8 classes)
- Bridges
- Pump Stations (in the works)



#### Data/System Integrations

- MiBridge (bridge system)
- MIDB (employee data)
- PDRP (insurance claims)
- M5 Fleet Focus (fleet)
- FIN MSTAR (materials)
- GIS SDE (asset data)
- Global (address info)
- MiLogin (single sign on)

## **Current Project Components:**







#### 2/23/2017 4:57:48 PM

Route

M-46

Location

Right

PR Begin

1205603

3290034

1015404

0497604

0445005

1015404

0270208

0857803

1014806

0857803

PR BMP

16.874

2.016

1.963

7.173

1.805

5.342

23.912

19.444

12.787

11.228

Travel_Direction     Travel_Direction       1 $\bigcirc$ (G392       Plus_Minus     +       2 $\bigcirc$ (1532     Location_Code     R       3 $\bigcirc$ (AAG7     Sign_Code     W1-8       4 $\bigcirc$ (52A1     Color_Code     R       5 $\bigcirc$ (76CF     Widh     36       6 $\bigcirc$ (4F49     Cluster_Location     1       7 $\bigcirc$ (96D1     Sign_Message     CHEVRON ALLIGNMENT       8 $\bigcirc$ (FB0C     Substrate        9 $\bigcirc$ (CED)     Background_Sheeting_Type        10 $\circlearrowright$ (0092     Legend_Sheeting_Type        11 $\bigcirc$ +24     Sign_CAD_File        12 $\circlearrowright$ (2032     Sign_Photo        13 $\bigcirc$ +24     Sign_Condition        14 $\circlearrowright$ (4241     Sign_Condition        15 $\bigcirc$ +24     Sign_Condition        16 $\circlearrowright$ (5E22     Pr_mp     13.57       17 $\circlearrowright$ molt     33330        18     (1952)     PoliNT_X     SigneCade <th></th> <th>Route_Name</th> <th>As</th> <th></th>		Route_Name	As	
Image: Sign_Code       +         2       3       1532       Location_Code       R         3       2       4467       Sign_Code       W1-8         4       3       5       3       7.4677       Sign_Code         5       3       7.4677       Sign_Code       W1-8         4       3       5       7.6672       Width       36         5       3       7.6672       Width       36         6       4.4F40       Cluster_Location       1         7       6       9.601       Sign_Message       CHEVRON ALLIGNMENT         8       6       6.4E40       Cluster_Location       1         7       6       9.601       Sign_Message       CHEVRON ALLIGNMENT         8       6       6.0E01       Sign_Message       CHEVRON ALLIGNMENT         9       6       (E002)       Sign_Message       CHEVRON ALLIGNMENT         9       6       (E002)       Sign_Type       [         10       6       (2002)       Sign_Code       [         11       6       42410 <td< td=""><td></td><td>Travel_Direction</td><td><b>0</b> (C202</td><td>1 0</td></td<>		Travel_Direction	<b>0</b> (C202	1 0
2       6       11532       Location_Code       R         3       ( $\frac{1}{4}$ A67       Sign_Code       W1-8         4       ( $\frac{1}{5}$ CA1       Color_Code	+	Plus_Minus	10.295   1	1 8
3       14A67       Sign_Code       W1-8         4       6       152A1       Color_Code       5         5       6       76CC       Width       36         6       6       14E40       48       5         6       6       14E40       Cluster_Location       1         7       6       199DI       Sign_Message       CHEVRON ALLIGNMENT         8       6       10021       Substrate       6         9       6       (CED)       Background_Sheeting_Type       1         10       6       10092       Egend_Sheeting_Type       1         11       6       1202       Sign_Type       1         11       6       1202       Sign_Challer_Sign       1         12       6       12022       Sign_Condition       1         13       7       24       Sign_Comments       1         14       6       1500	R	Location_Code	3 <u>{1532</u>	2 🖸
4       3 (52A1       Color_Code         5       3 (76CF       Width       36         6       3 (4F40       Height       48         6       3 (4F40       Cluster_Location       1         7       3 (96DF       Sign_Message       CHEVRON ALLIGNMENT         8       3 (90DF       Substrate          9       3 (CED)       Background_Sheeting_Type          10       3 (0992)       Legend_Sheeting_Type          11       3 - 245       Sign_Ohot          12       5 (2032)       Sign_Photo          13       3 - 245       Sign_Condition          14       6 (4920)       Sign_Comments          15       3 - 245       Sign_Onments          16       6 (5ED2)       r_mp       13.57          17       2 - 241       sign_inst_id       33380          18       6 (BD58)       FOINT_X       599664.4502	W1-8	Sign_Code	3 {4A67	3 🙆
5       6       7 (Fight       36         6       6       14F40       Cluster_Location       1         7       6       99001       Sign_Message       CHEVRON ALLIGNMENT         8       6       60002       Subtrate          9       6       CCE0       Background_Sheeting_Type          10       6       00922       Legend_Sheeting_Type          11 $2 - 244$ MDOT_Suppled_Sign          12       6 (2003)       Sign_Photo          13 $2 - 244$ Sign_Condition          14       6 (4240)       Sign_Comments $pr_mm$ 13.57           16       6 (5602) $pr_mp$ 13.57         17 $2 - 244$ sign_inst_id       33330         18       0       100017_X       Sepect 4502		Color_Code	🕄 {52A1	4 🔞
Idea       Height       48         6       6       (4F40)       Cluster_Location       1         7       6       99001       Sign_Message       CHEVRON ALLIGNMENT         8       9       6       (E001       Subtrate         9       6       (E002       Subtrate       Image: CheVRON ALLIGNMENT         9       6       (E002       Subtrate       Image: CheVRON ALLIGNMENT         9       6       (CE01)       Background_Sheeting_Type       Image: CheVRON ALLIGNMENT         10       6       (0092)       Legend_Sheeting_Type       Image: CheVRON ALLIGNMENT         10       6       (2003)       Sign_Type       Image: CheVRON ALLIGNMENT         11 $-244$ MDOT_Suppled_Sign       Image: CheVRON ALLIGNMENT         12       6       (2003)       Sign_CheVRON       Image: CheVRON ALLIGNMENT         13 $-244$ Sign_CheVRON       Image: CheVRON ALLIGNMENT       Image: CheVRON ALLIGNMENT         14       6       (4240)       Sign_Convinents       Image: CheVRON ALLIGNMENT       Image: CheVRON ALLIGNMENT         16       6       (5ED2)       Image: CheVRON	36	Width	0 /76CE	5 0
6       6       64/40       Cluster_Location       1         7       6       (960)C       Sign_Message       CHEVRON ALLIGNMENT         8       6       (B0C)S       Substrate       CHEVRON ALLIGNMENT         9       6       (CED)       Background_Sheeting_Type       C         10       6       (0092)       Legend_Sheeting_Type       C         11 <b>0</b> +245       MDOT_Suppled_Sign       C         12       6       (2032)       Sign_Chat_File       C         13 <b>0</b> +245       Sign_Condition       C         14       6       (4240)       Sign_Comments       C         15 <b>0</b> +245       Sign_Comments       C         16       (5ED2)       pr_mp       13.57       S       S         17 <b>0</b> 242       Sign_Inst_id       33380       S       S         18       0       (BD65)       POINT_X       S69964.4502       C       C	48	Height		· •
7       © 1980C       Sign_Message       CHEVRON ALLIGNMENT         8       (B0Cf       Substrate          9       © (CED)       Background_Sheeting_Type          10       © (0092       Legend_Sheeting_Type          11       © +241       MDOT_Suppled_Sign          12       © (2002)       Sign_Type          13       © +241       Sign_Cond_File          14       © (4240)       Sign_Condition          15       © +241       Sign_Condition          16       © (5ED2)       pr_mp       13.57         17       © +241       sign_inst_id       33380         18       © (BD58)       POINT_X       Segned.4502	1	Cluster_Location	3 <u>{4F40</u>	• •
6       9       CEDC       Subtrate         9       6       (CED)       Background_Sheeting_Type         10       6       (0092)       Legend_Sheeting_Type         11       6       -241       MDOT_Suppled_Sign         12       6       (2032)       Sign_Photo         13       6       -241       Sign_Condition         14       6       (4240)       Sign_Condition         15       6       -241       Sign_Comments         16       (5ED2)       pr_mp       13.57         17       -244       sign_inst_jid       33380         18       (6 (BD58)       POINT_X       Sege64.4502	CHEVRON ALLIGNMENT	Sign_Message	3 <u>{96DD</u>	7 🖸
9       CEDI       Background_Sheeting_Type         10       0092       Legend_Sheeting_Type         11       3 → 241       Sign_Type         12       3 (2032       Sign_Photo         13       3 → 241       Sign_CAD_File         14       3 (3 → 241       Sign_Comments         15       3 → 241       Sign_Comments         16       3 (5ED2       pr_mp         17       3 - 341       sign_inst_id         18       3 (BD58)       POINT_X		Substrate	8 (B0C6)	8 🔞
10       6       10092       Legend_Sheeting_Type         11       3 → 241       Sign_Type       Imoor_Suppled_Sign         12       6       12032       Sign_Photo         13       3 → 241       Sign_CAD_File       Imoor_Suppled_Sign         14       6       (4240)       Sign_Condition         15       3 → 241       Sign_Control       Imoor_Suppled_Sign         16       6       (5ED2)       pr_mmp       13.57         17       3 → 341       sign_inst_id       333380         18       6       (BD58)       POINT_X       Supsed.4502		Background_Sheeting_Type	CED	9 🖸
Sign_Type       MDOT_Supplied_Sign         12       Sign_Photo         13       Sign_Zhoto         14       Sign_Condition         15       Sign_Comments         pr_num       242006         pr_mp       13.57         17       Sign_Inst_id       33380         18       GBDBB       POINT_X       Sepectation		Legend_Sheeting_Type	C (0092	10
W → 24       MDOT_Suppled_Sign         12       © (2D32       Sign_Photo         13       © → 244       Sign_CAD_File         14       © (4240)       Sign_Condition         15       © → 244       Sign_Comments         16       © (5ED2)       pr_mm         17       © → 241       sign_Inst_jid       33380         18       © (1005)       POINT_X       Segne4.4502		Sign_Type		
12   ©   [2032]   Sign_Photo     13   ©   → 24   Sign_CAD_File     14   ©   (4240)   Sign_Condition     15   ©   → 24   Sign_Comments     16   ©   (5ED2)   pr_mp     17   ©   → 24   sign_inst_id     18   ©   (BD56)   POINT_X		MDOT_Supplied_Sign	⊖ → <u>241</u>	
13   SignCAD_File     14   Sign_Condition     15   Sign_Control     16   Sign_Comments     17   max     18   (5ED2     19   max     10   Sign_Inst_id     133380     18   (6B58: POINT_X     19   Sign_Inst_id     10   Sign_Inst_id		Sign_Photo	3 {2D32	12 🕴
14   ③ (424)   Sign_Condition     15   ③ → 241   Sign_Comments     16   ④ (5ED2)   pr_mm     17   ④ • 020   sign_inst_id     18   ③ (BD58)   POINT_X       2000		SignCAD_File	🕄 → <u>241</u>	13 🔞
Sign_Comments       Sign_Comments         16       5 (5ED2)       pr_mm       242006         17       2 mo22       sign_inst_id       33880         18       3 (BD58)       POINT_X       59964.4502		Sign_Condition	3 {424D	14 🔞
Image: Second system       242006         Image: Second system       pr_mp       13.57         Image: Second system       sign_inst_id       33380         Image: Second system       sign_inst_id       338380         Image: Second system       system       system         Image: Second system       system       system		Sign_Comments	$\Theta \rightarrow 241$	15 👩
Construction       Construction<	242006	pr_num	C ((ED)	16
17       Sign_inst_id       338360         18       G (BD58: POINT_X       59964.4502	13.57	pr_mp	O IDEDZ	10
18 3 (BD58, POINT_X 599964.4502	338380	sign_inst_id	→ 241	17 8
	599964.4502	POINT_X	8 {BD58	18 🔞
19 🐼 → 241			3 → 241	19 🔞

**Guardrail** Attribute Data

Type B

Type T

÷

=

=

Daniel Winnie Danny Collins **David Hundley** 

Duane/Eric Brown Jonas Russel Mike Hirschman Mt FLeasant Garage

Niles Garage

Paul Selvidge

Robert Blank Ryan Buhl Saginaw East Garage Saginaw West Garage Shane Knight Steve Raymond

0

Paul Ruessegger

0.069

0.027

0.011

0.019

0.014

0.028

0.022

0.038

0.015

0.009

ш.





 Other than Roads and Bridges, our GIS asset inventories are sporadic or not current.

#### Each Asset type requires a Data Collection and Condition Assessment guide.

- Current large scale collection efforts/plans:
  - Extraction of Guardrail and Sign data from photolog imagry
  - Contractor "Boots on the Ground" collection of Culvert (1'-10') data (5 counties)
  - Looking into mobile LiDAR technology







### **Asset Collection Efforts**





Transportation Asset Management System (TAMS) Implementation Plan for Maintenance

#### **Direct Force Pilot:**

- Since August 2016
- Four Direct Garages
- Approx 350 Work Orders
- Working off DTMB test environment (DEV)
- Limited use of Mobilvue, SR, and reports so far.

- **Service Requests** Work Orders
- **MobileVue**
- Maintenance Reporting
- Phase 1: Pilot Direct Force Phase 2: All Direct Force Phase 3: Pilot Local Agency Phase 4: All Local Agency

#### SUPERIOR Mackinad Alpena Alpen NORTH Grand GRAND Ottawa St. Clair METRO Marshall SOUTHWEST UNIVERSITY

### **MMS Schedule**

rvstal Falls

Dickins



#### Near Term items for TAMS project:

- "Go live" (production server) roll out November 2017 (target)
- Ipads for maintenance users (outside of project)
- Final load of existing asset data
- Configuration of signs inventory/project module
- Configuration of pump Station module

Long Term:

- Add additional asset types, data systems, and asset management tools
- Improve asset inventories (photolog extraction, LiDAR, etc)
- Incorporate Construction data into asset inventories
- Implement comprehensive Data Governance, global asset management, and new business practices to MDOT *(cultural Change)*

### **Forecasted Schedule**





- Enterprise Asset Management is a "major effort" and requires a lot of groups to implement.
- It is important to have your IT Area involved, but their pace might not match yours.
- With numerous stakeholders, communication is key, along with managing expectations.
- Data Governance is imperative
- Cultural Changes to how we do business.

### **Advice/Lessons Learned**

![](_page_14_Picture_7.jpeg)

### THANKS!

![](_page_15_Picture_1.jpeg)

**Transportation Asset Management System** 

Justin Droste PE drostej@michigan.gov

Asset Management Engineer MDOT Operations Field Services 6333 Lansing Rd; Lansing, MI 48917

![](_page_15_Picture_5.jpeg)