NDSU UPPER GREAT PLAINS TRANSPORTATION INSTITUTE



1

UGPTI Programs

- Advanced Traffic Analysis Center (ATAC)
- Center for Surface Mobility Applications & Real-time Simulation environments (SMARTSe[SM])
- DOT Support Center (DOTSC)
- Mountain-Plains Consortium (MPC) ***Focus Areas:*** *agricultural freight, rural traffic analysis, tribal outreach*
- North Dakota Local Technical Assistance Program (NDLTAP)
- Rural Transportation Safety and Security Center (RTSSC)
- Small Urban and Rural Center on Mobility (SURCOM)
- Transportation Learning Network (TLN)
- Commercial Vehicle Safety Center (CVSC)

2

Asset Management Tools and AI

Presentation Outline

- Quick overview of the Surface Selection Tool
- Overview of GRIT
- New Layers – Sign Inventory
- Integration of Artificial Intelligence
- Examples of AI impacts to Asset Management
- Questions

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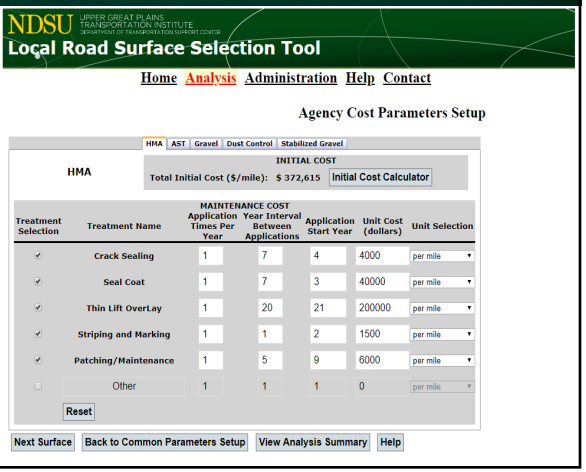
3

Overview of Local Road SST

- Cost Analysis Tool for low volume roads
- Based on SD cost tool and enhanced by students at UGPTI
- WEB based free app



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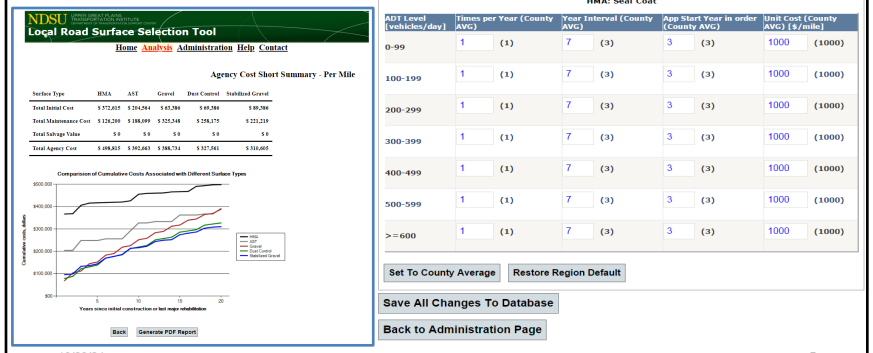
Overview of Local Road SST

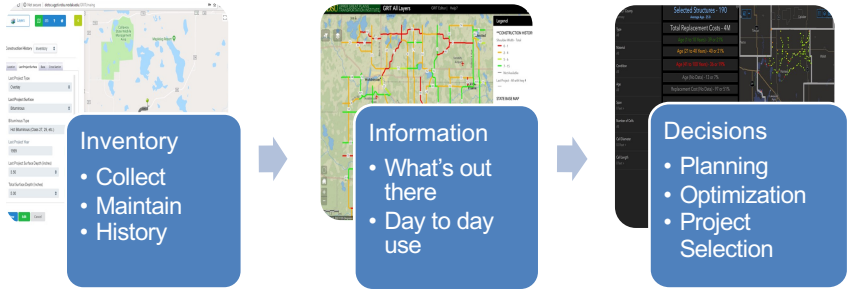


https://dotsc.ugpti.ndsu.nodak.edu/SurfaceSelection/

5

Geographic Roadway Inventory Tool

GRIT - Inventory Web Maps Dashboards



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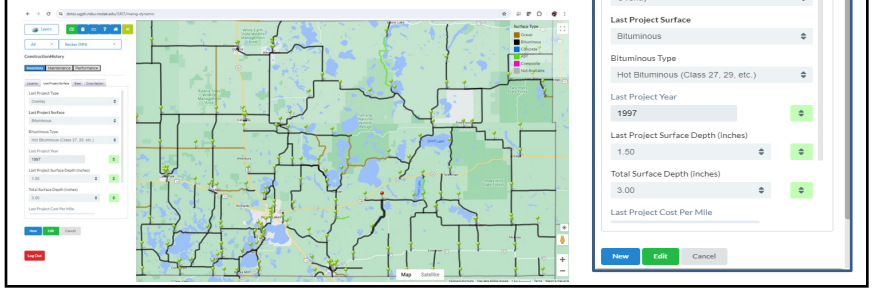
6

GRIT

GRIT - Inventory

- Easy to use forms with google maps
- Easy to access – Web based
- Inventory & Maintenance data
- Simple tools



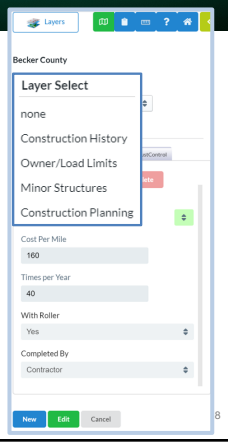
7

GRIT

GRIT - Inventory

- Several Layers
- Many Data Items (Useful)
- Growing as requested
  - New - Signs

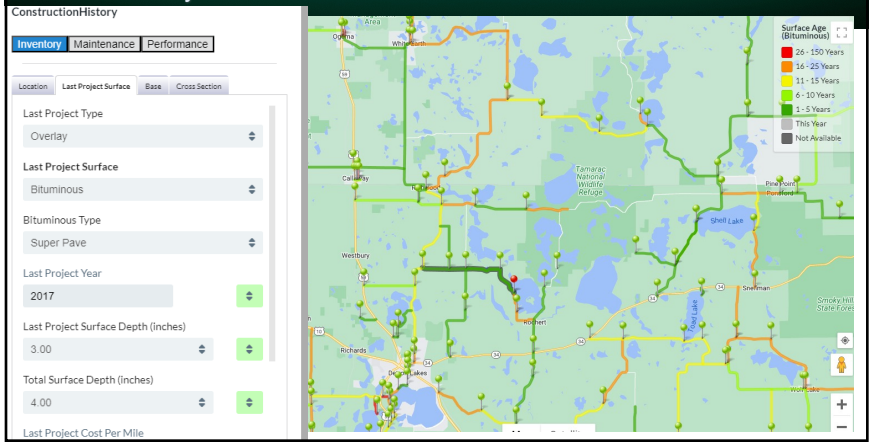
Construction History	Construction Planning	Bridges	Load Restrictions	Maintenance
Location	Location	Location	Location	Const History
Highway	Highway	Highway	Highway	Segments
Surface Type	Project Type	Type	Owner	Bituminous
Proj Type	Project #	Material	Func. Class	Seal Coat
LP Year	Planned Year	Span	Maintenance	Crack Seal
LP Depth	Status	Cell Diameter	Road Type	Patching
Total Depth	Bid Open Date	Cell Width	Seas. Load Limit	Striping
Base Type	Cost	Cell Height	Seas. Gross Lmt	Year
Base Depth	Start Date	Length	Yr Rnd Limit	Cost
Base Year	Public Impact	Year Installed	Yr Rnd Gross	Gravel
Base Treatment	Restrictions	Cover Depth		Blading
SubGrd Strength	Detour	Replace Cost		Regravel
Treatment	Comments	Condition		Reshape
Lane Width	Funding Srce	Rating Date		Spot Repair
Shoulder Width	Funding Splits	GVW Limit		Dust Control
Grade Year	Fund Commit	Axle Limit		Frequency
Striping				Cost
Rumble Strips				Concrete
Curbs				Cracks
Inslope				CPR
ROW				Cost
Owner				



8

GRIT – Construction History

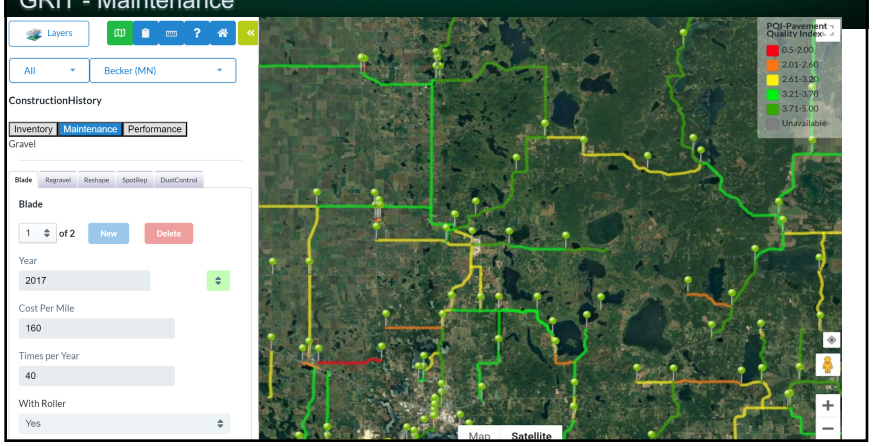
GRIT - Inventory



9

GRIT – Construction History

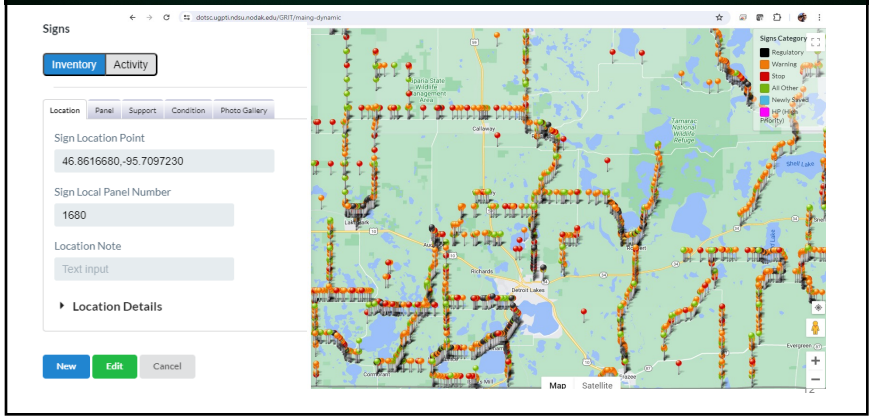
GRIT - Maintenance



10

GRIT – Sign Inventory

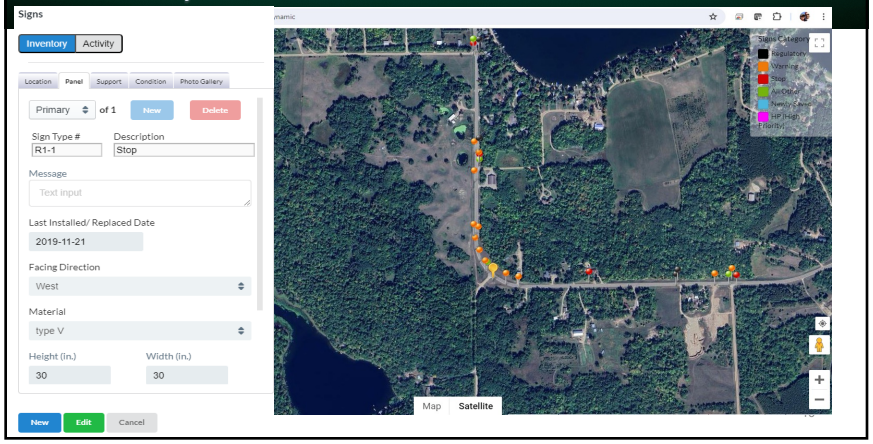
GRIT - Inventory



12

GRIT – Sign Inventory

GRIT - Inventory



13

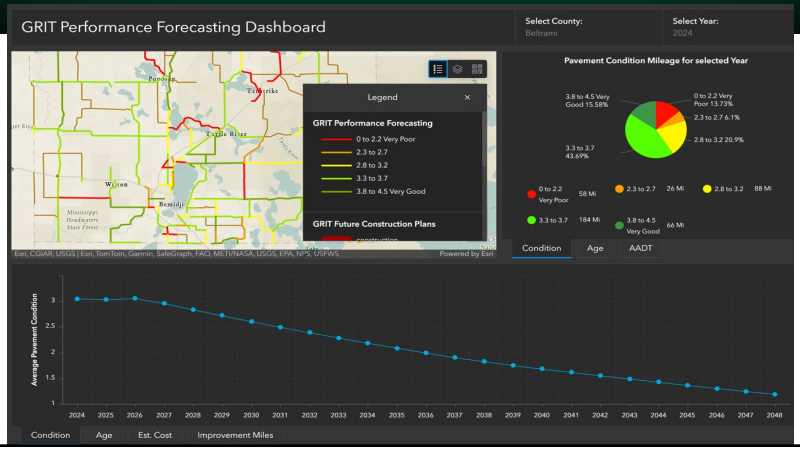
GRIT – Sign Inventory

GRIT - Inventory

14

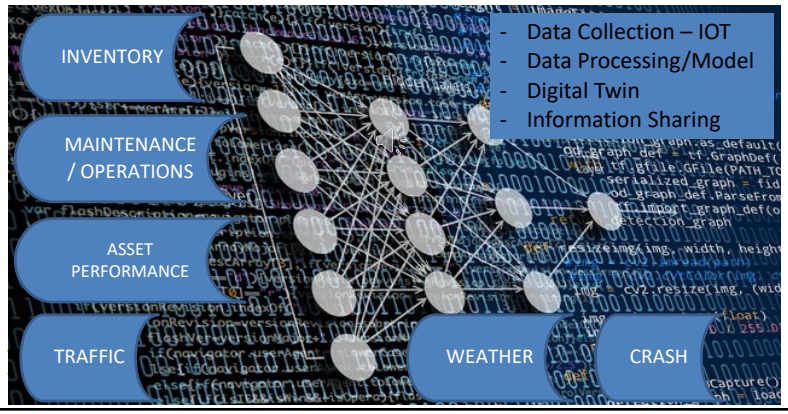
GRIT

Dashboards



16

AI for Transportation Asset Management

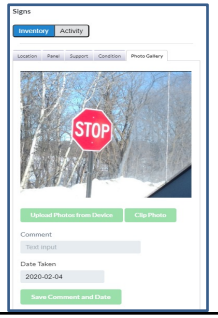


17

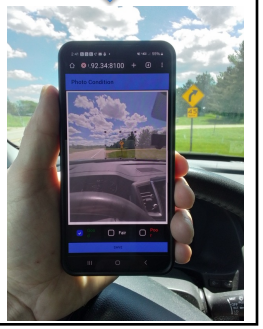
AI for Asset Management – Example 1

- Sign Inventory/Management
  - MUTCD Reflectivity Requirements
  - Becker County 10,000+ Signs
  - Difficult to rate and complete Inv.
- AI to assist Data Collection
  - Train ML based on existing Inventory & Photos
  - Small App to take photo and upload to server
  - AI Automatically extracts data from photo and updates GRIT
  - Future ver will also rate condition
- AI models will forecast and make recommendations for sign management.

Train AI on Existing Data



Build AI Model to Extract Info



18

AI for Asset Management – Example 2

- Gravel Road Inventory/Management
  - Life Cycle 3 days to 3 months
  - Many factors affect condition
  - Need condition and traffic - daily
- AI to assist Data Collection
  - Train ML to count vehicles and rate condition from camera images.
  - Build in-expensive IOT camera that can run model during the Summer.
  - Processed data uploaded to GRIT and combined with other data.
- AI models will forecast and make recommendations for GR management.

19

Geographic Roadway Inventory Tool

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https://www.ugpti.org/resources/grit/

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21