

11th National Conference on Transportation Asset Management



Best Practices of GIS Applications in Asset Management at NCDOT

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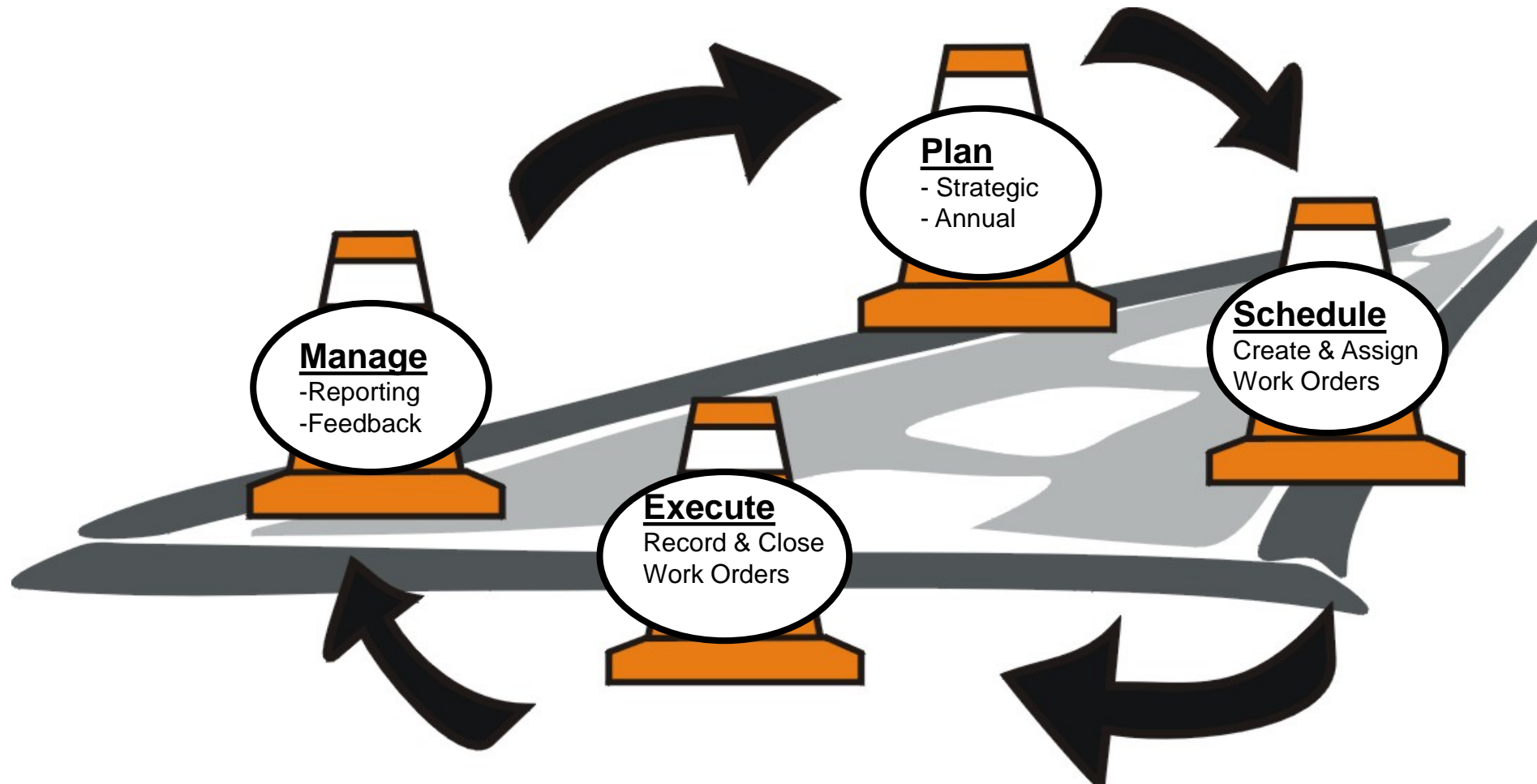
Agenda

- The use of GIS and the asset management cycle
- Highway network linear referencing system (LRS)
- Field data collection of asset inventory and condition
- Collect and manage roadway network characteristic data
- Managing asset management plans



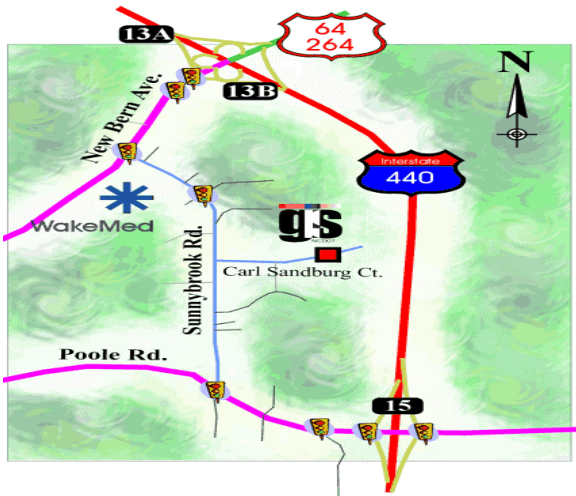
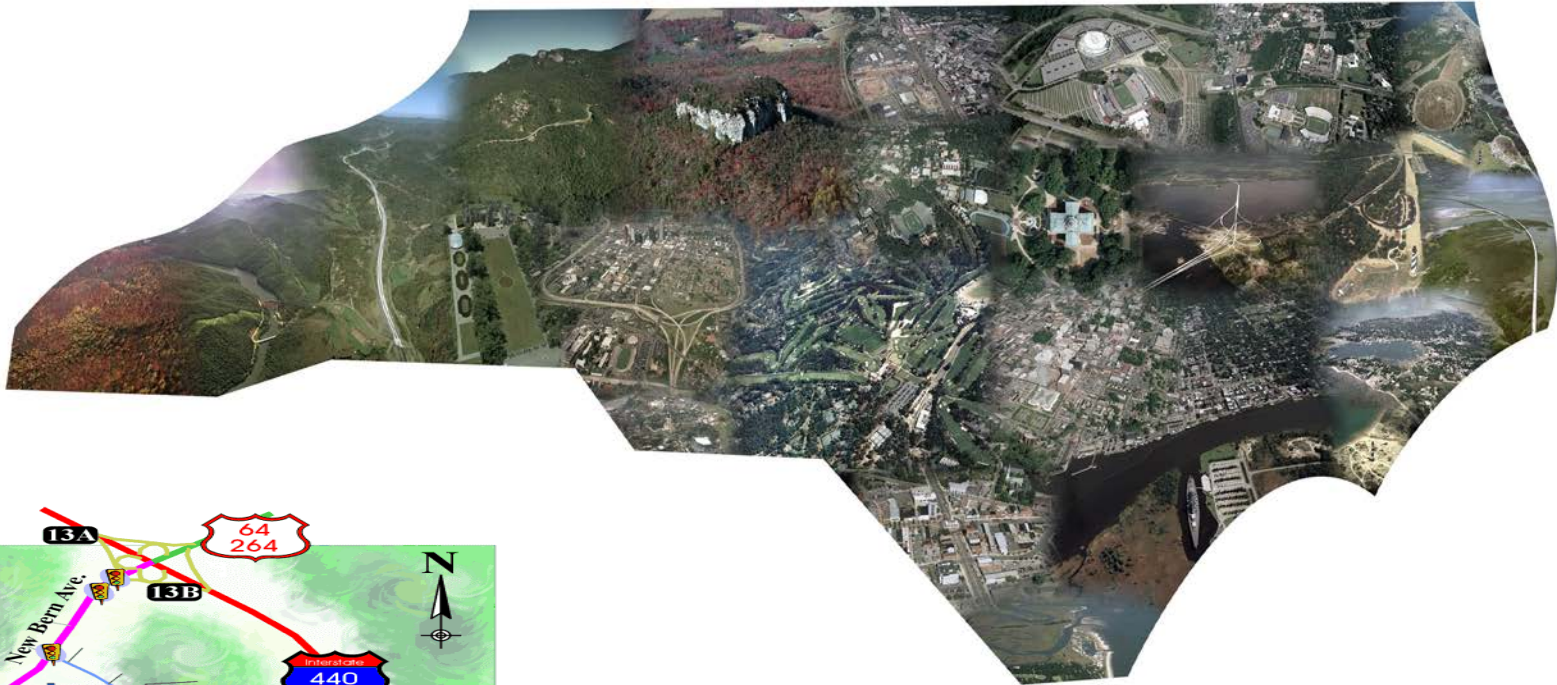
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The use of GIS and the asset management cycle

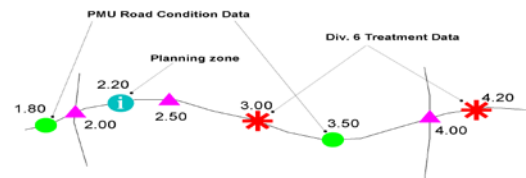


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Highway Network Linear Reference System (LRS)



Updated GIS ROADCONDITION Layer

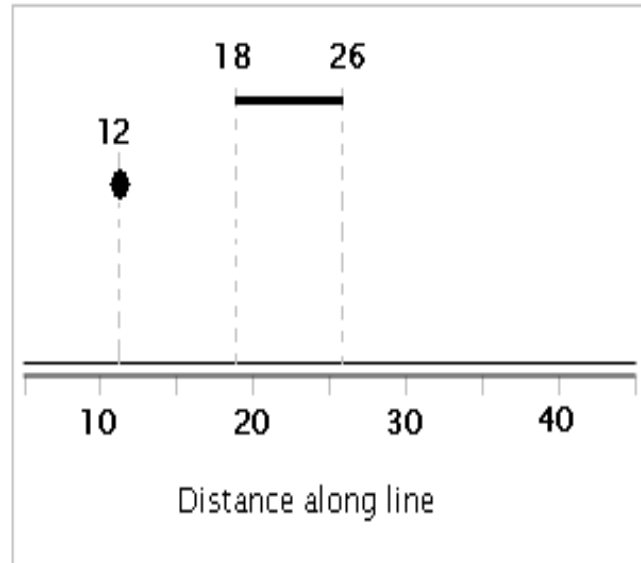


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Linear Referencing: The Basics

Linear Referencing is a method of spatial **referencing**, in which the locations of features are described in terms of measurements along a **linear** element, from a defined starting point.

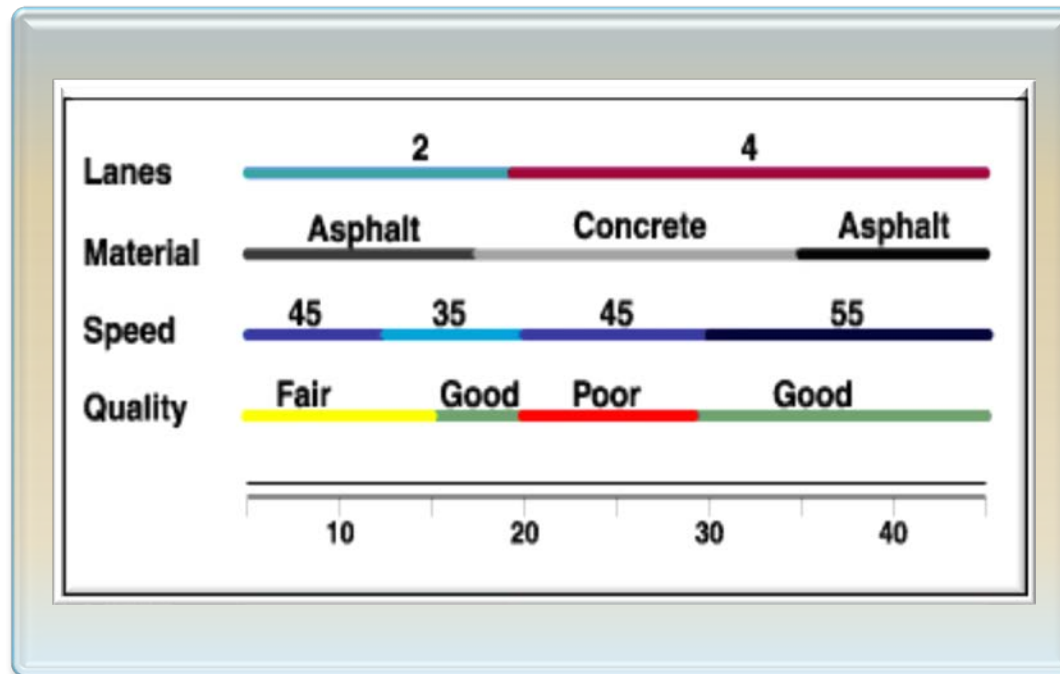
- A route ID or reference and a measure value along the line segment.
- One measure creates point events, two measures line events
- NCDOT's Linear Referencing System is County, Route, Milepost based.



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Linear Referencing: The Basics

Linear Referencing Systems provide the opportunity to display and analyze data based on common locations along a linear feature such as a roadway.



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Advanced Linear Referencing

- Multiple Linear Referencing Methods
- Dynamic Route Representations
- Time Aware LRS
- Rule-based Event Behavior



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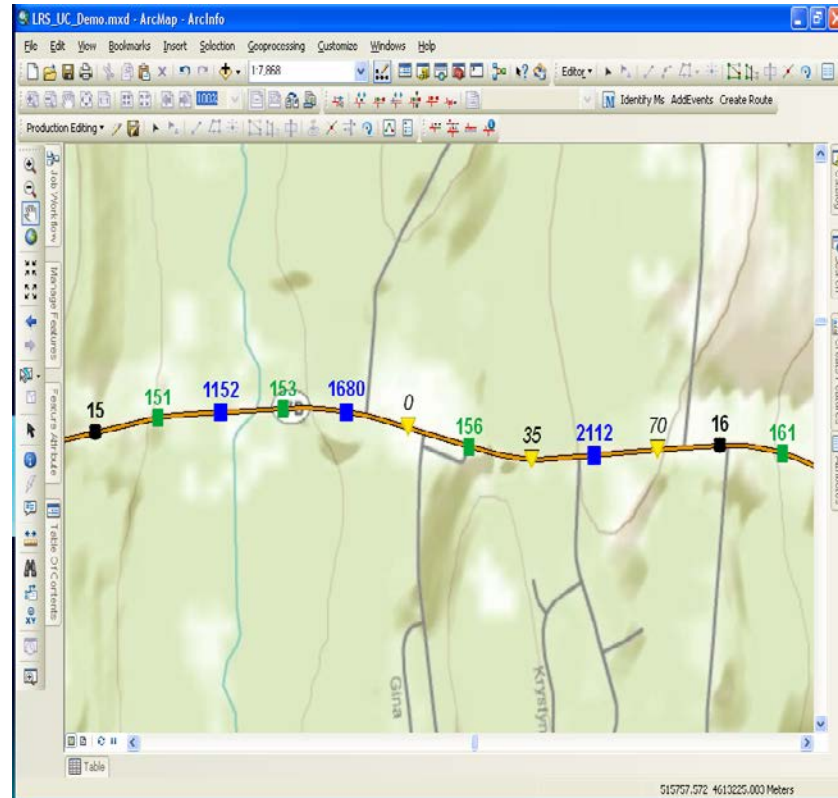
Multiple Linear Referencing Methods

Reference Markers

Project Stationing

Mile Posts

Road Inventory

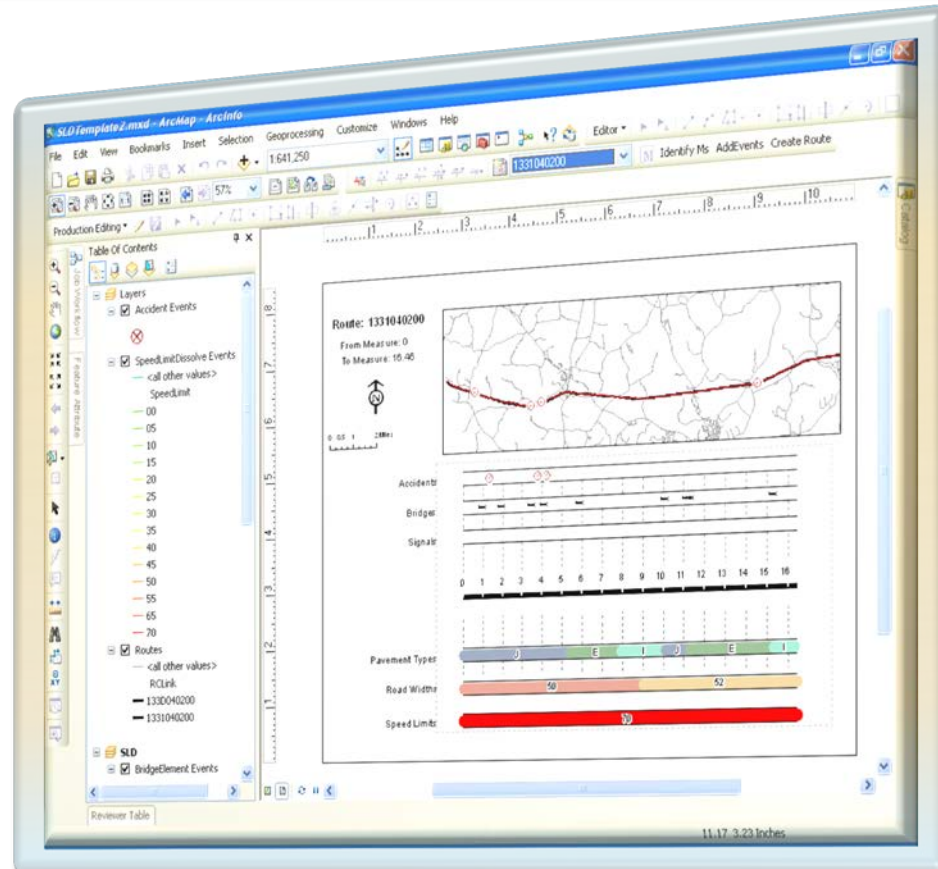


LRMs are like map projections; users need to be able to translate seamlessly from one to another



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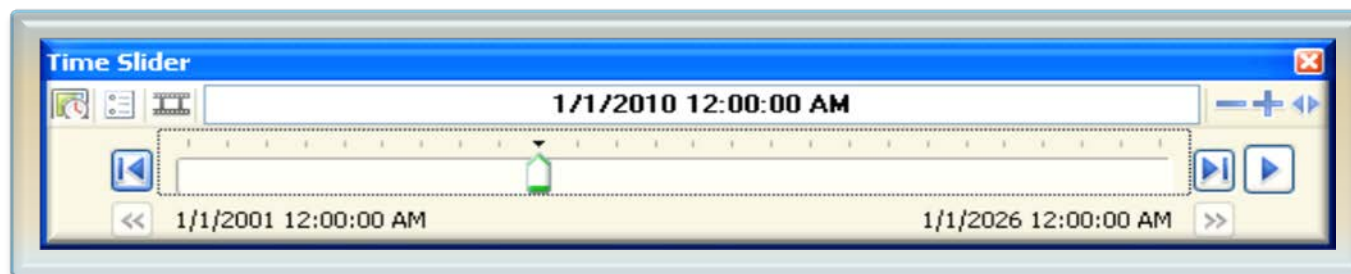
Dynamic Straight Line Diagram



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Time Awareness in Linear Referencing

- Present – We need to see the current state of our highways
- Past – We need to see what our highways looked like when incidents occurred
- Future – We need the ability to add planned highways to our data



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LRS Complexities/Consideration:

Rule-Based Event Behavior

There are 4 things that can happen to events when routes change

1. The event moves



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LRS Complexities/Consideration:

Rule-Based Event Behavior

There are 4 things that can happen to events when routes change

1. The event moves
2. The event stays put
3. The event goes away
4. The event snaps to another route



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LRS: Why is this important in Asset Management?

Asset Management Systems are built on the foundation of an LRS.....

Pavement Management Systems

- Locating distresses and treatments along the LRS

Maintenance Management Systems

- Locations of repairs
- Identifying problem areas

Asset Inventories

- Location of assets along roadway



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GIS in Asset Management: Field Data Collection

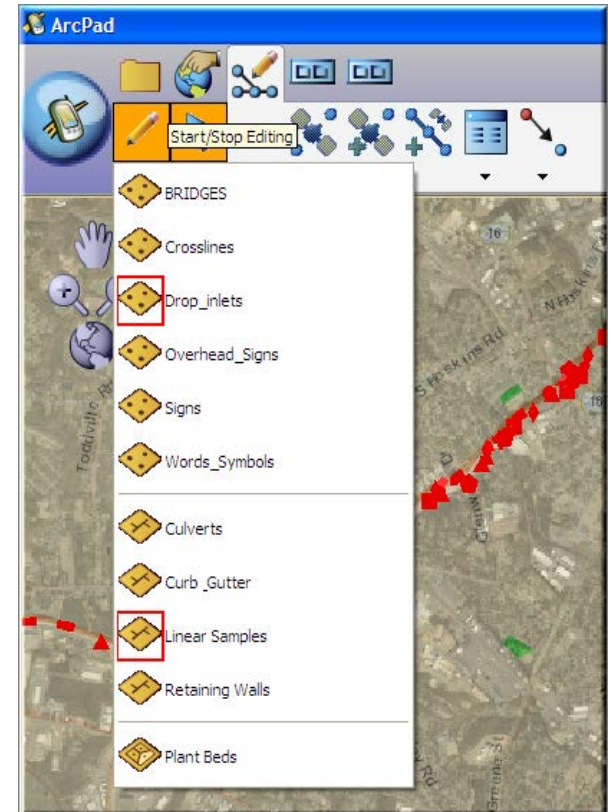
Multiple systems available:

NCDOT has used or is considering:

- ArcPad
- ArcGIS Collector/AGOL
- Survey 123

Allows users to gather data spatially and record attributes on site.

Eliminates need for data entry after returning to office

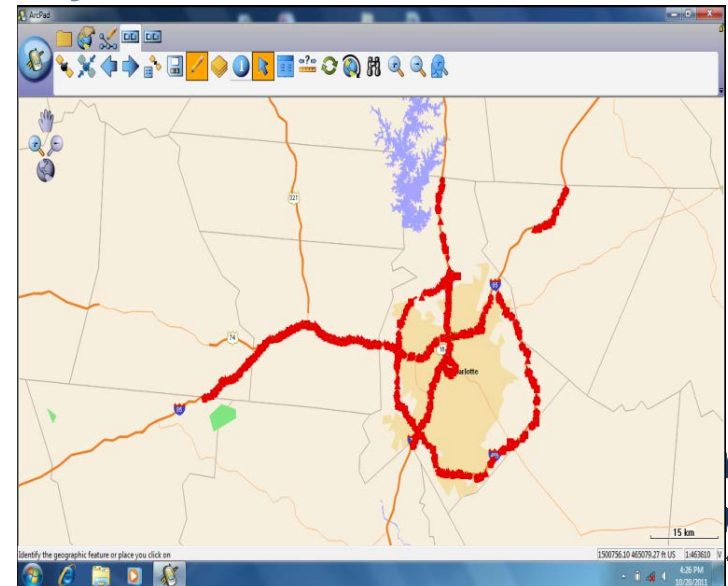


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GIS in Asset Management: Field Data Collection

NCDOT uses of ArcPad in Asset Management:

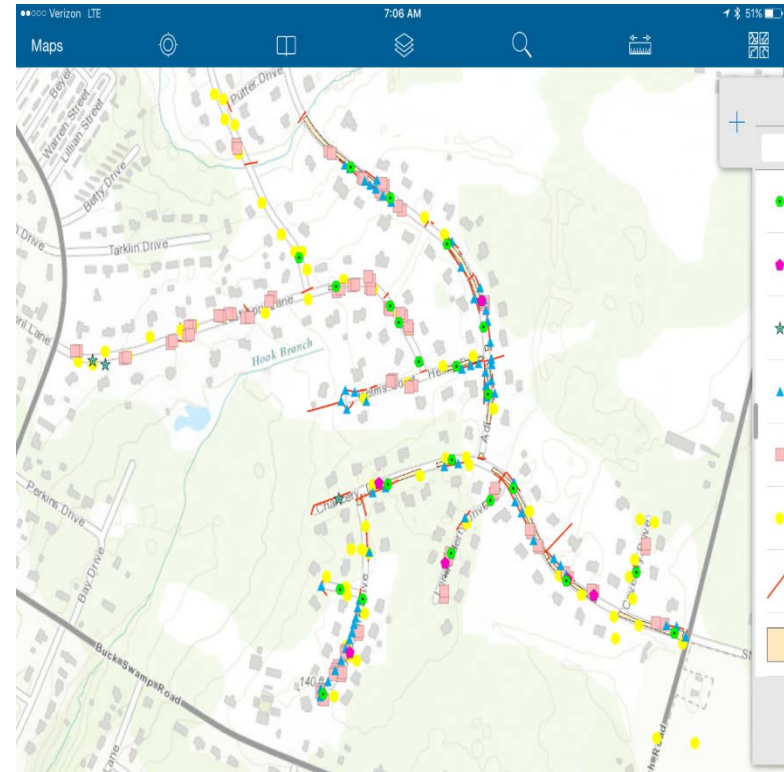
- Performance Based Maintenance Contract
- Maintenance Condition Assessment Program
- NC Turnpike Authority Maintenance Rating Program
- Pavement Condition Survey of Secondary System
- Small Pipe (non-NBIS) inventory
- Roadway Reviews
- Non-System Inventory Project



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GIS in Asset Management: Field Data Collection

- **Best Practices:**
- **Data Synchronization across devices**
- **Aerial imagery**
- **Quality Control through forms**
 - **Validations**
 - **Conditional**
 - **Automated entry**
- **Quality Assurance reviews**



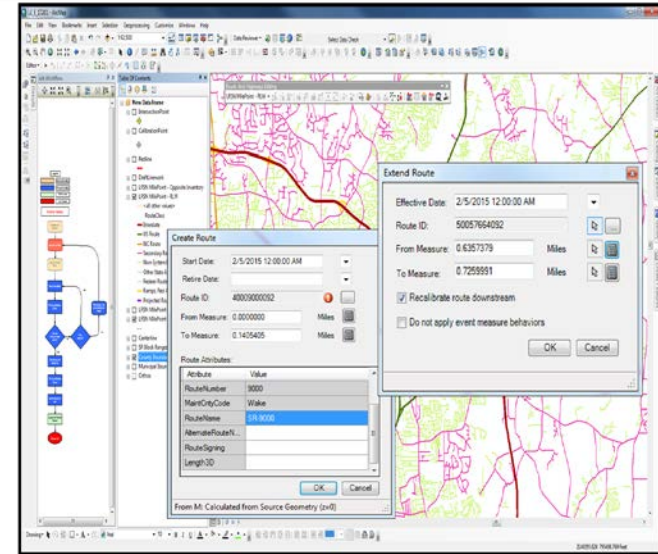
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GIS in Asset Management: Managing Your Network – Business Integration

Best Practices at NCDOT:

Identify and understand roles

- Ownership vs stewardship
- Owners/stewards include:
GIS, Asset Management, Traffic Safety,
Traffic Survey, Planning,
14 Highway Divisions, etc.....

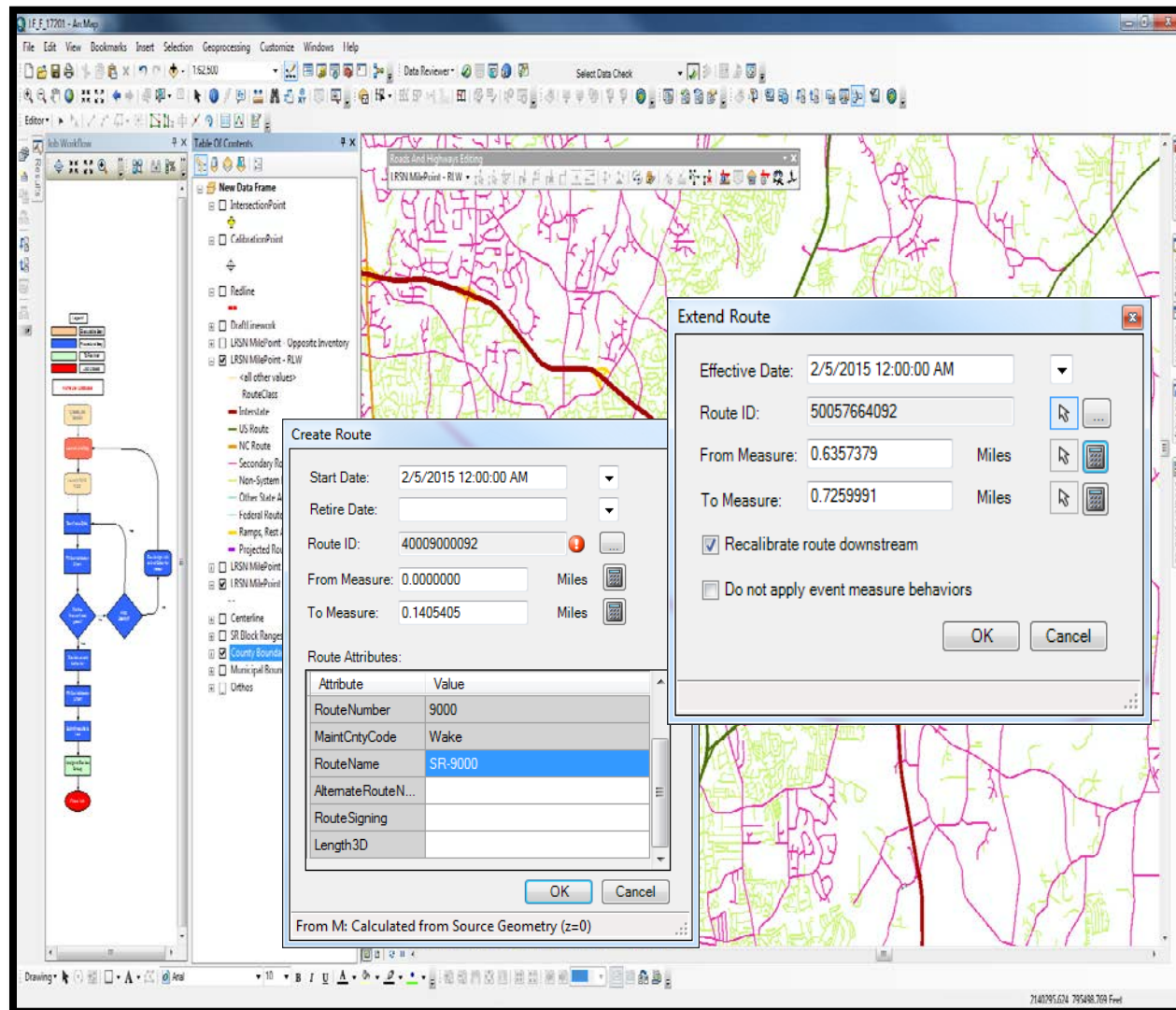


Empower data owners/stewards with appropriate tech

- Phased rollout of Roads and Highways tools
- Eliminate data silos whenever possible by using common LRS
- Staff appropriately to maintain data currency and relevance



After It's Live – Maintain Our LRS



After It's Live – Maintain Events on the LRS

The screenshot shows the MSALTPATH Editor software interface. On the left, a 'TIP' dialog box is open, displaying a table of attributes for a selected road segment. The table has columns for 'Attribute' and 'Value'. The 'LaneWidth' attribute is currently selected and highlighted with a dashed blue border. Below the table, there are checkboxes for 'Show network names', 'Show layer names', and 'Go to next measure upon save'. At the bottom of the dialog are '< Back' and 'Save' buttons. The background shows a map of a road network with a red line indicating the selected segment.

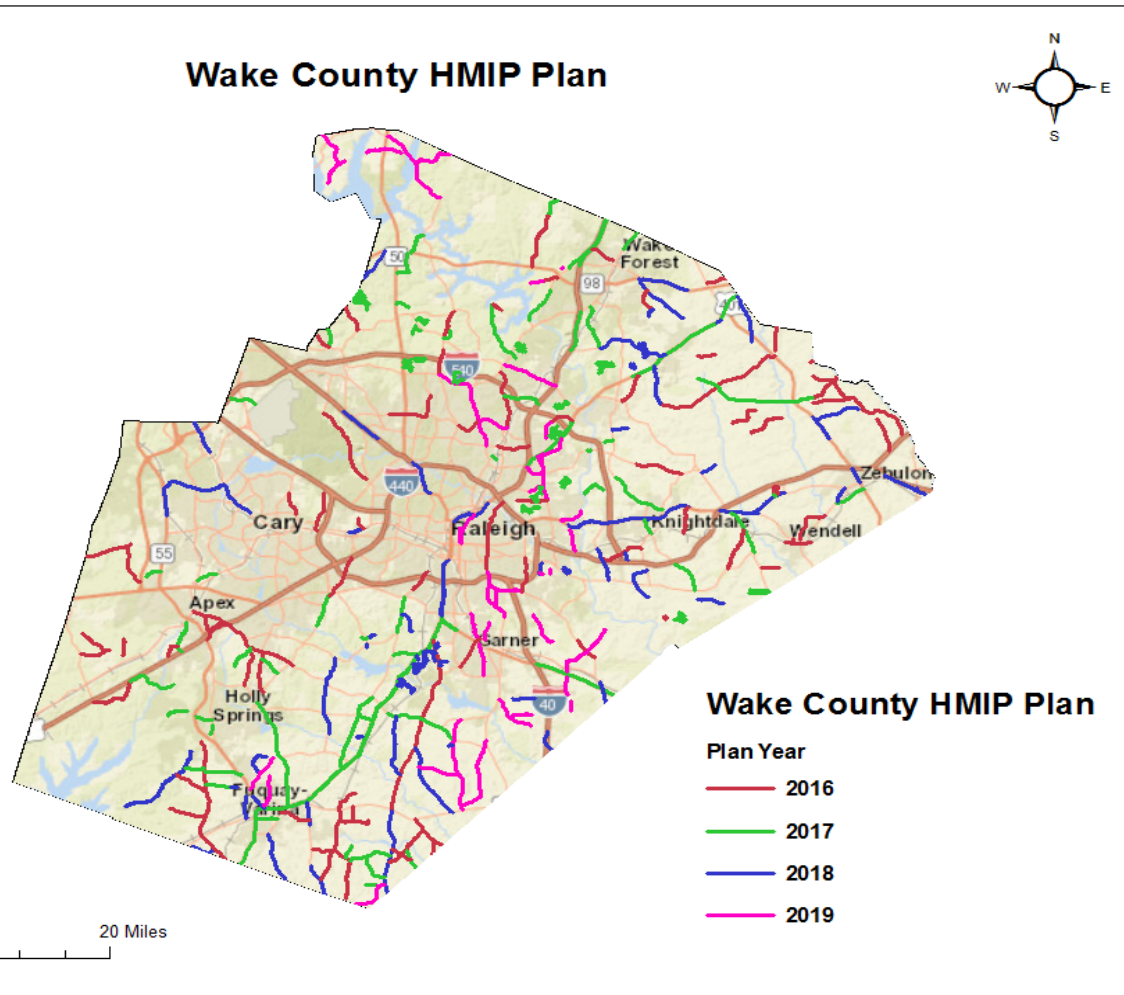
Attribute	Value
RtTrnLnWidth	
RtPvdShldrWidth	
RtShldrType	Grass or Sod
RtShldrWidth	
ROW	60
MedianType	Curb
MedianWidth	4
LftTrnLnType	
LftTrnLnWidth	
LftPvdShldrWidth	
LftShldrType	Grass or Sod
LftShldrWidth	
LaneWidth	

☐ Show network names
☐ Show layer names
☒ Go to next measure upon save

< Back Save

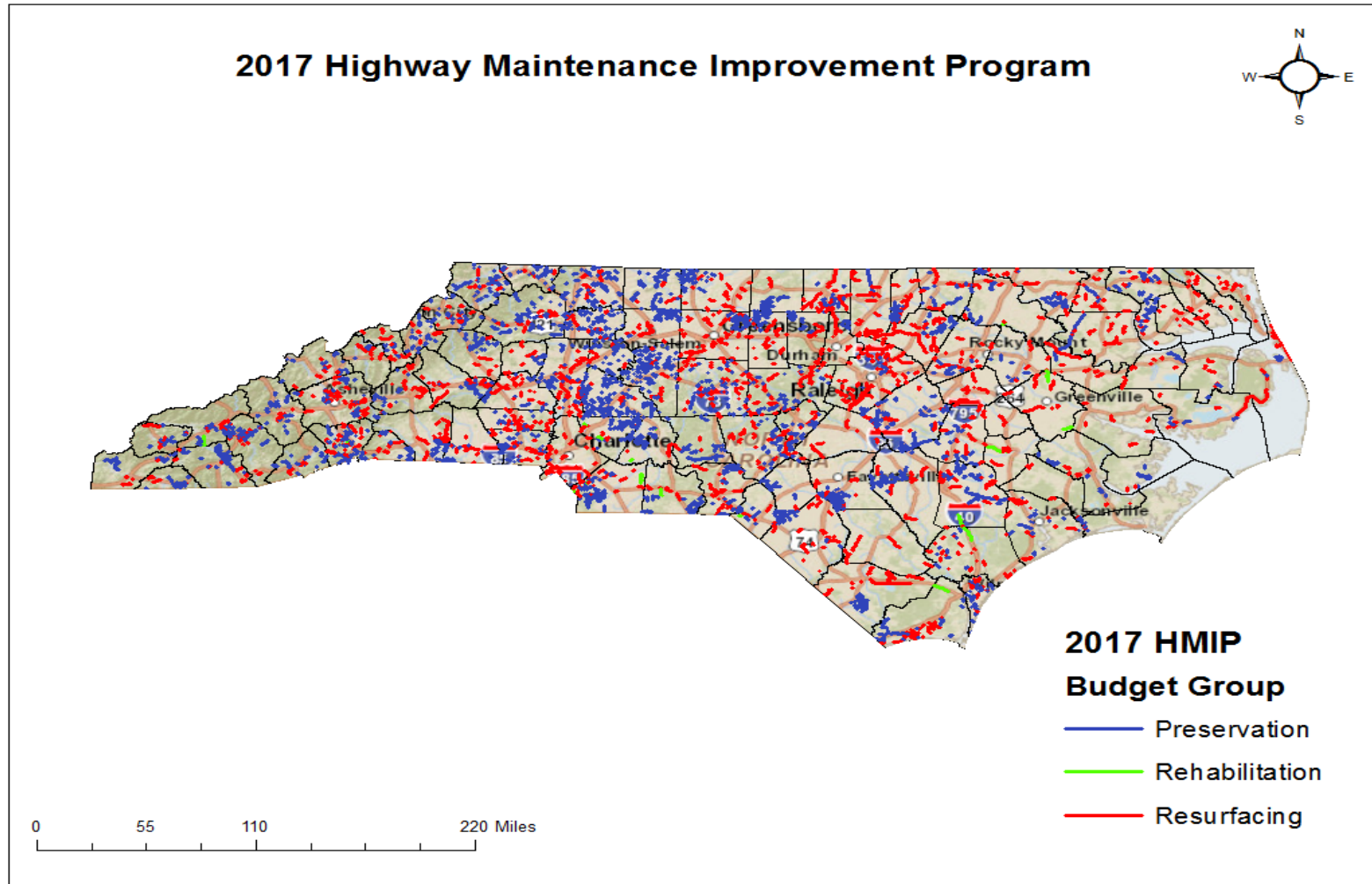
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Managing asset management plans



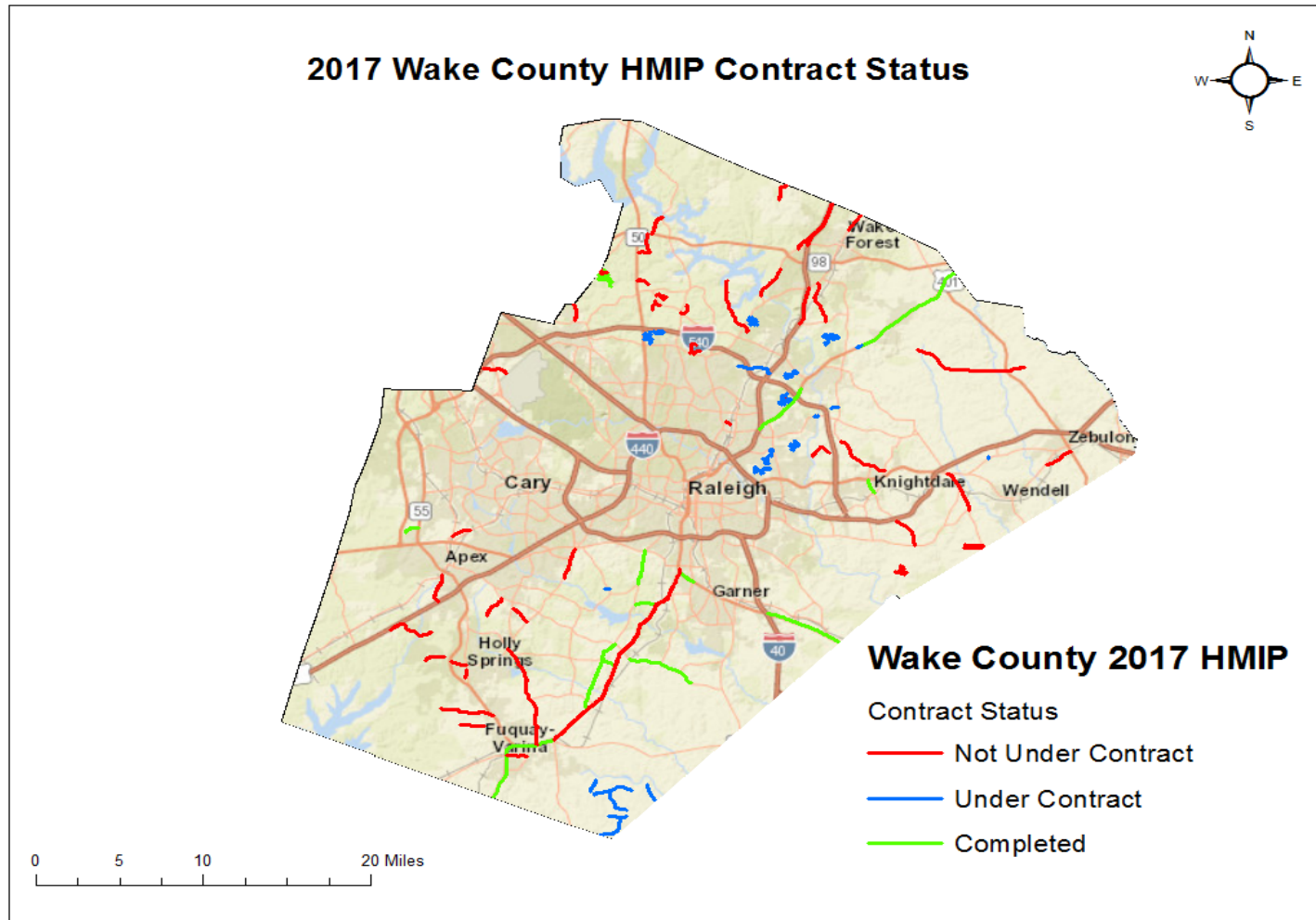
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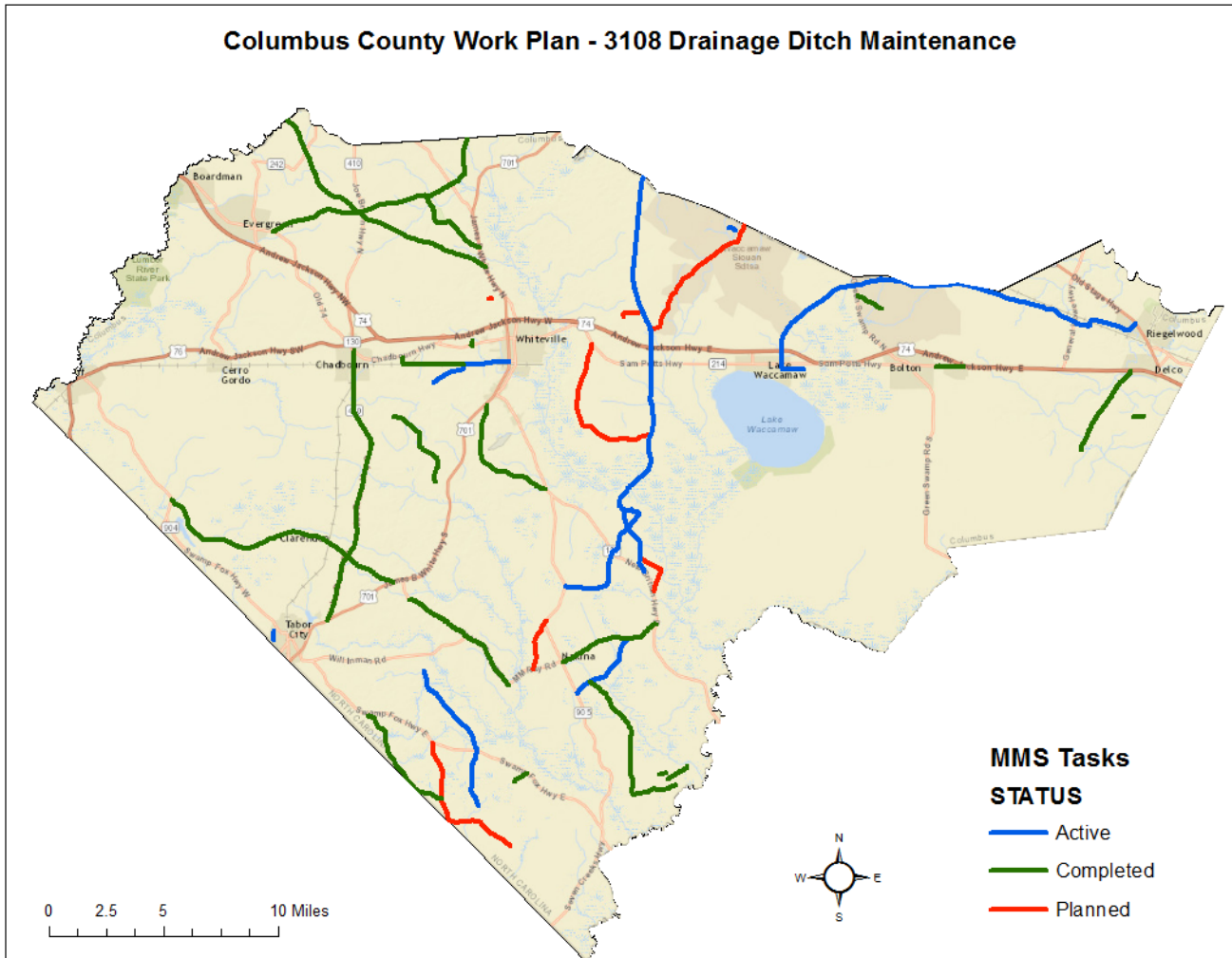
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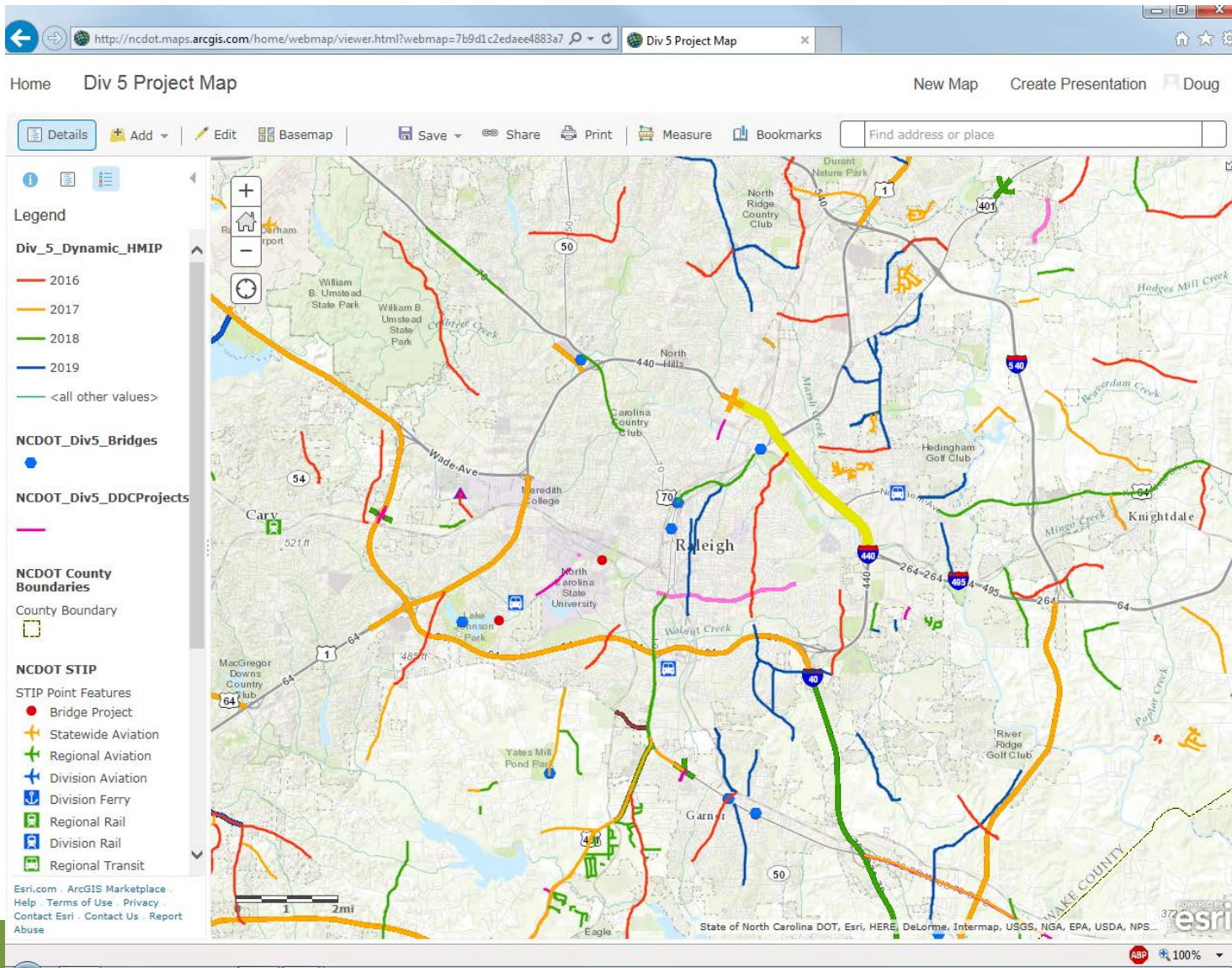
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Questions??





Thank You!

