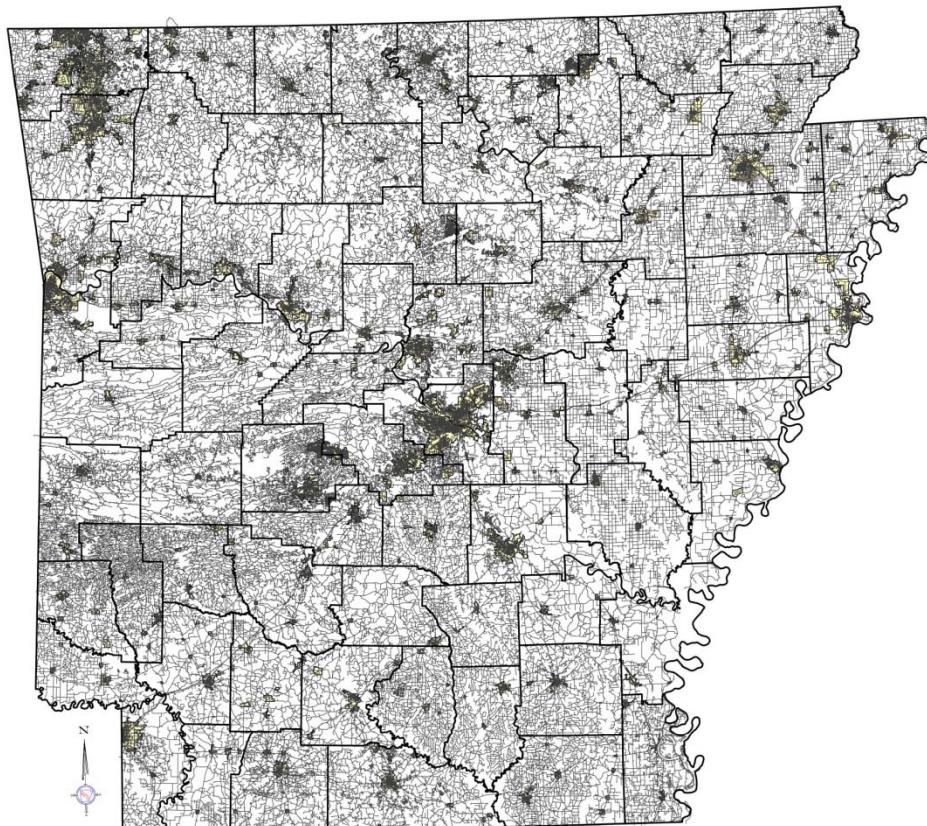


# All Public Roads Linear Referencing System (LRS)

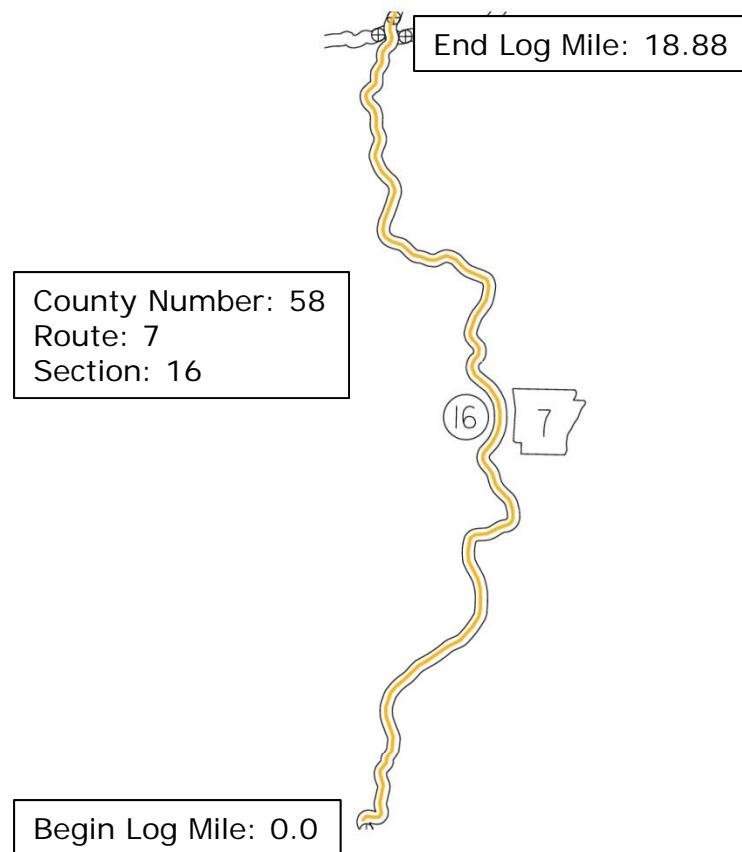
GIS Board

September 10, 2013



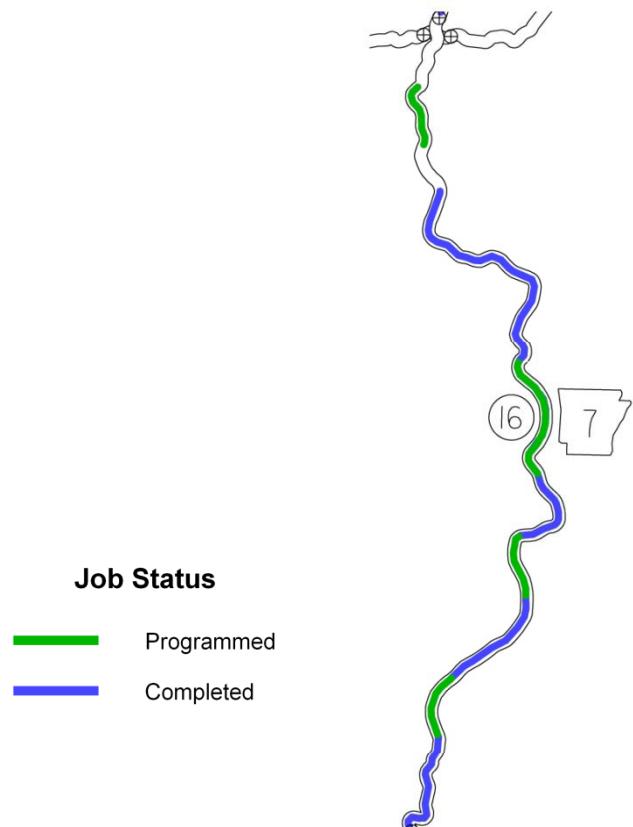
# What is a Linear Referencing System?

A reference system that allows users to identify locations by a measurement on a linear feature .



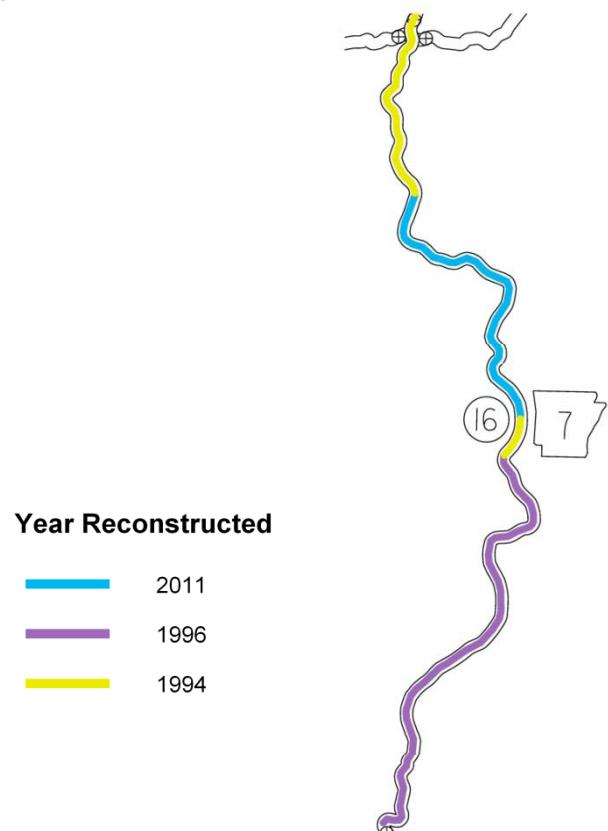
# What is a Linear Referencing System?

A reference system that allows users to identify locations by a measurement on a linear feature .



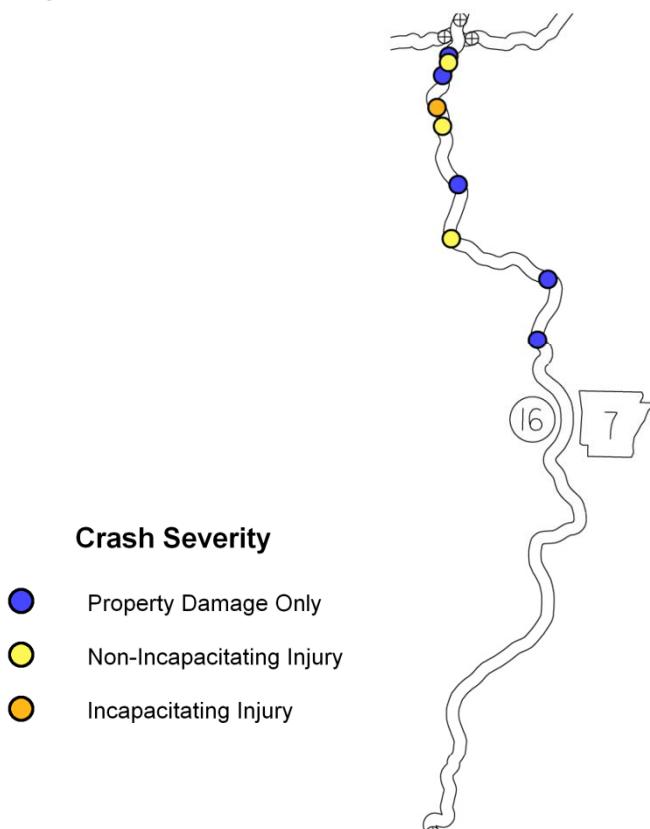
# What is a Linear Referencing System?

**A reference system that allows users to identify locations by a measurement on a linear feature .**



# What is a Linear Referencing System?

A reference system that allows users to identify locations by a measurement on a linear feature .



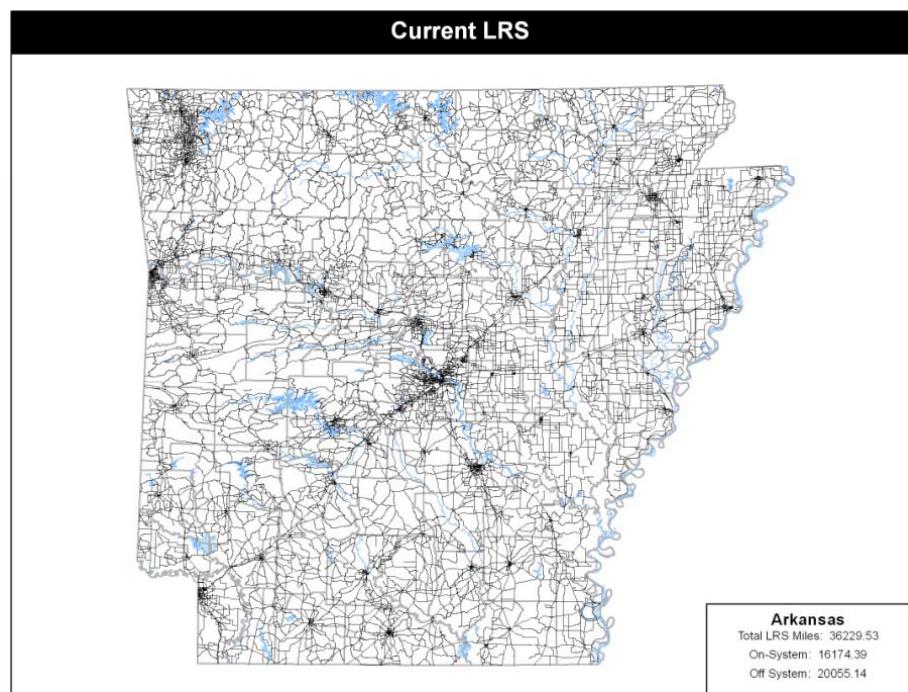
# What do we have?

**On-System LRS (State Highway System) – 16,400+ Miles**

**Off-System LRS (All Other Routes Eligible for Federal-Aid) – 20,000 + Miles**

**The current LRSs are used daily to:**

- Generate Routes for Permits
- Map data and events collected
- QC/QA for asset and event location verification
- Locate data
- Produce maps and figures



# Why an All Public Roads LRS?

## August 7, 2012, Memorandum

- Joint memo from FHWA Offices
  - Office of Highway Policy Information
  - Office of Planning
- Beginning June 15, 2014 States must:**
  - Include **ALL PUBLIC ROADS** in LRS networks
  - Use **DUAL CARRIAGEWAY** representation for divided routes

## Initial Reaction



# Why an All Public Roads LRS?



## TRANSPORTATION FOR THE NATION (TFTN)

**Vision:** TFTN dataset includes consistent, current, high quality road centerline data for the entire country.

- Goal is to stop using several networks for specific projects
  - Census or TIGER data
  - FWHA
  - Vendors (Navteq or Tele Atlas)
  - State 911 Centerlines
- Have one nationwide LRS for multi-purpose use
  - Routing
  - Data reporting/analysis
  - Addressing
  - Freight Analysis Framework

# Why an All Public Roads LRS?

- **Highway Performance Monitoring System (HPMS)**

- How condition, performance and data is reported annually

- **Certified Public Road Mileage (23 CFR 460)**

- It's not just a number anymore
  - All public Roads LRS would be used to visually validate public road mileage

- **Safety data on all public roads (23 USC 148)**

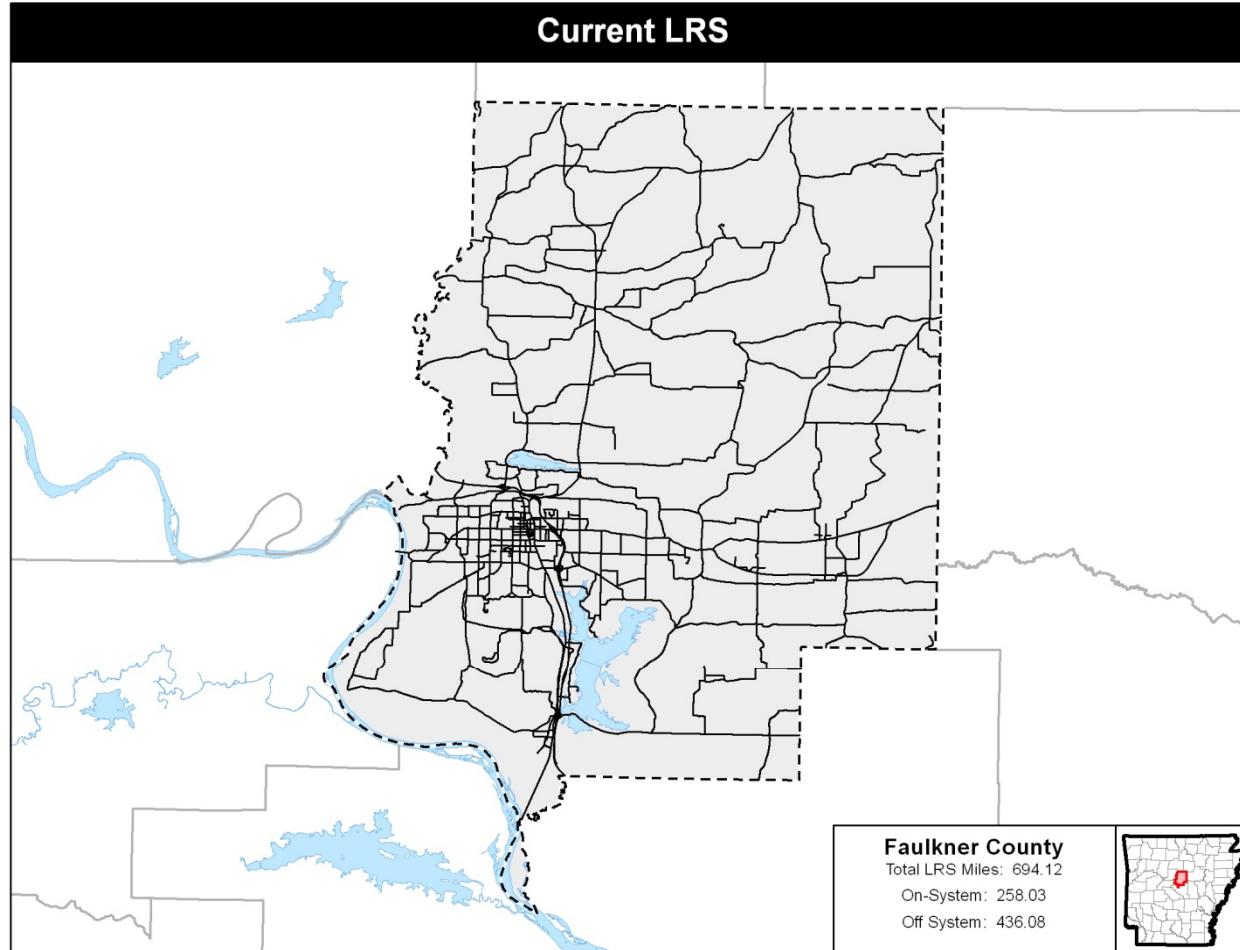
- MAP-21 requires the development of an all public roads LRS which safety attributes can be attached

- **National Bridge Inventory on all public bridges**

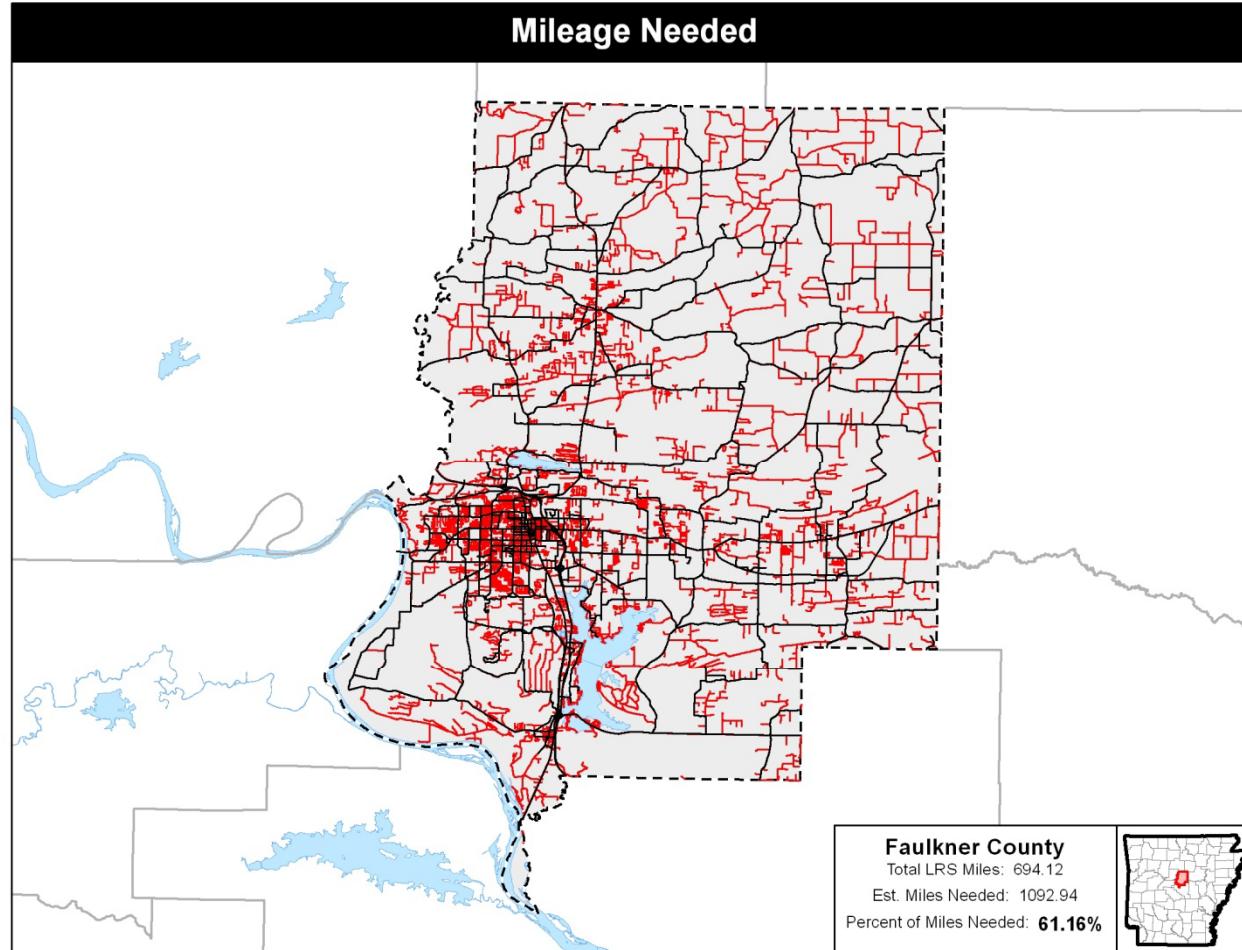
- Bridge locations must be tied to the LRS

- **Transportation for the Nation (TFTN)**

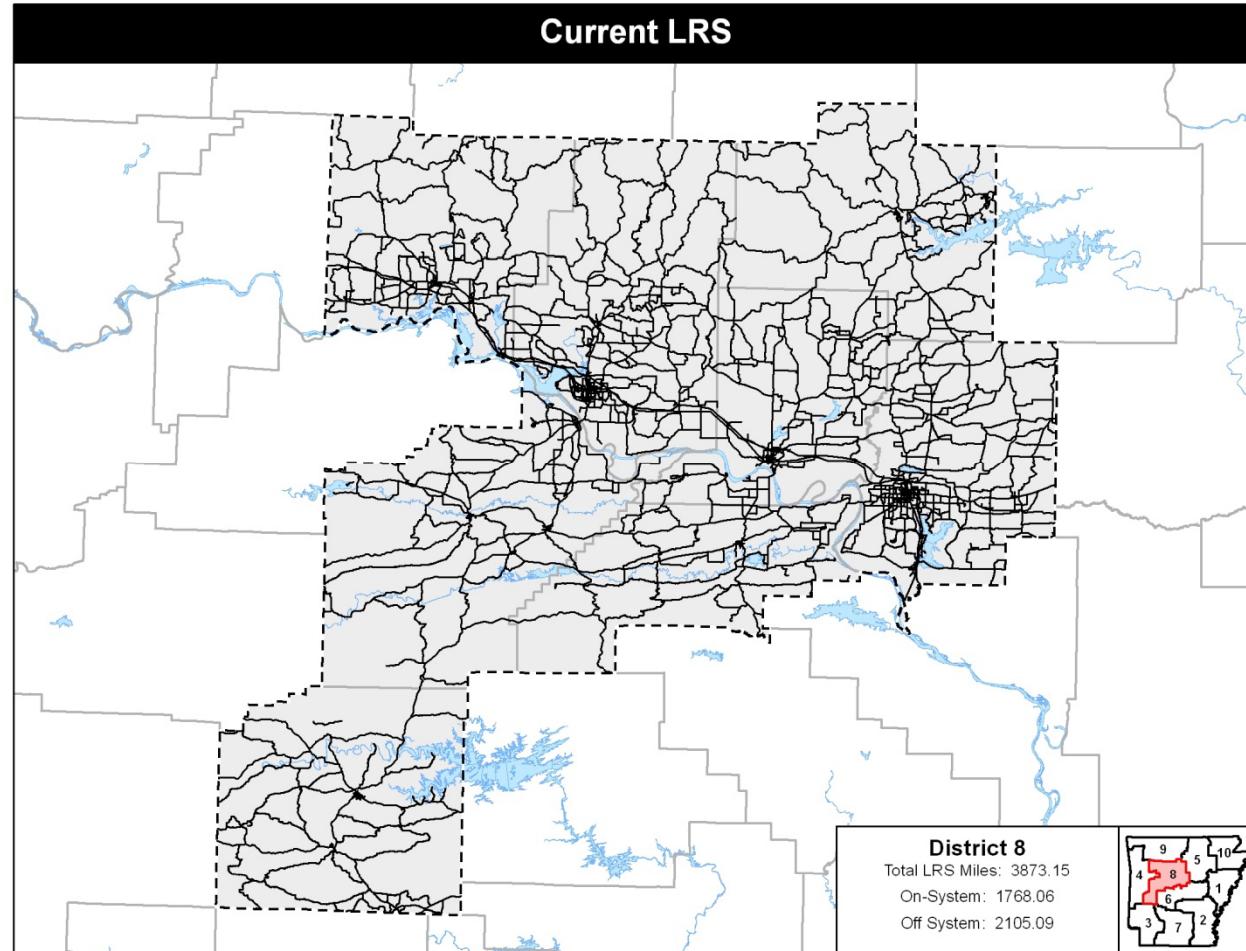
# What do we need?



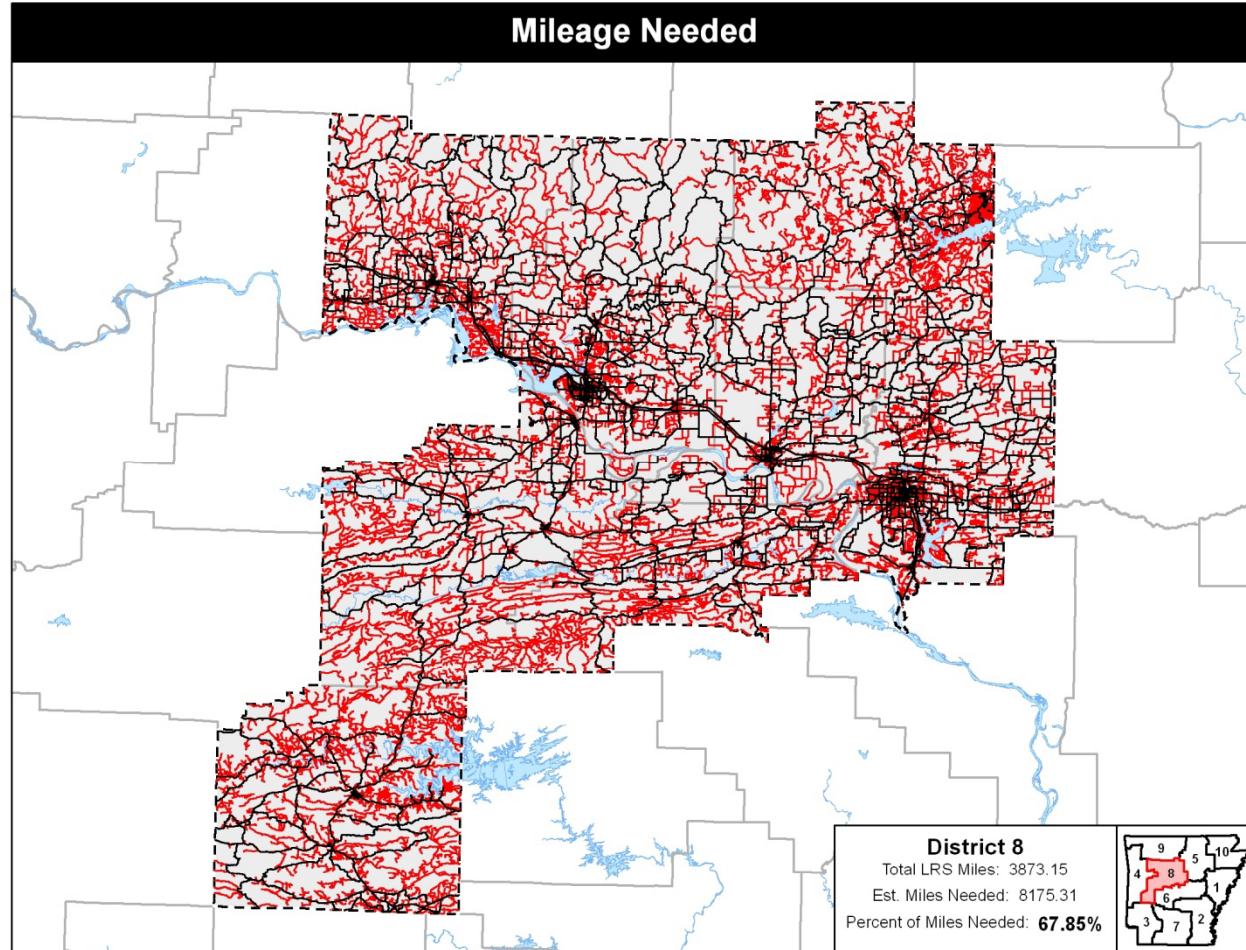
# What do we need?



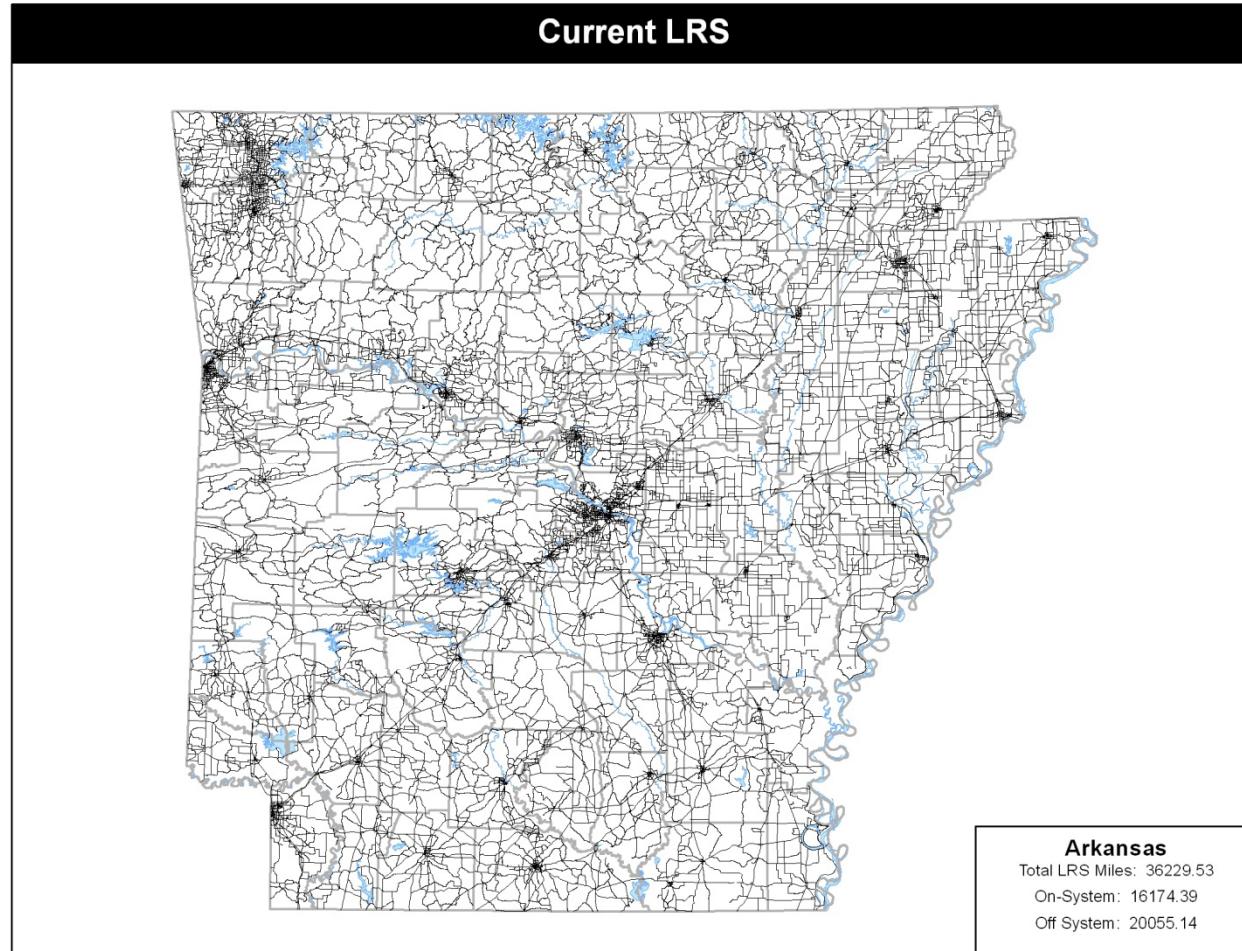
# What do we need?



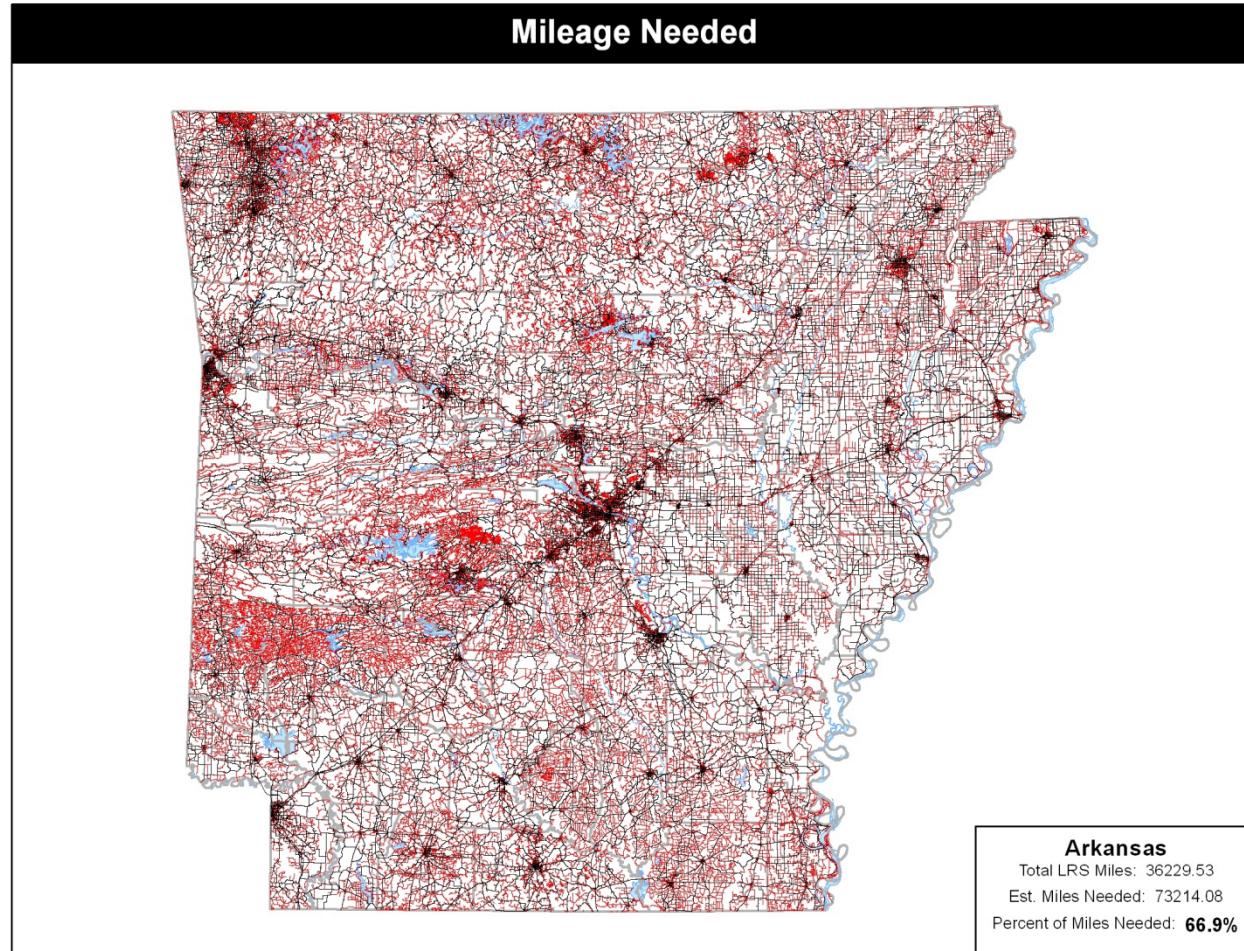
# What do we need?



# What do we need?



# What do we need?

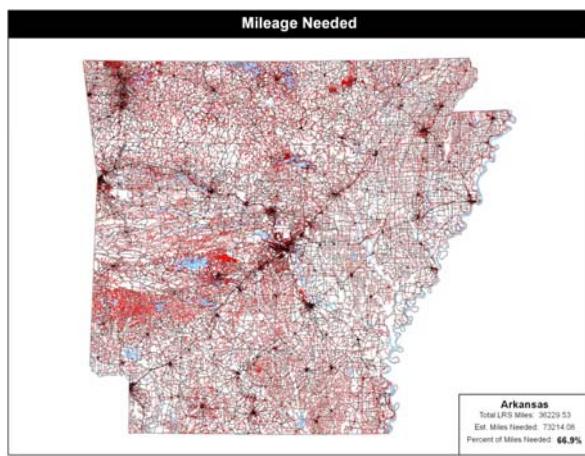


# How do we get there from here?

**Planning and Research Division developed a LRS Team to raise awareness of the new requirement, discuss what each representative would need from an all public roads LRS and to develop a plan for including all public roads in the current LRS.**

**Representatives from the following are on the Team:**

- FHWA (Advisory role)
- Arkansas Geographic Information Office
- Pulaski County Assessor's Office
- State Aid Division
- Bridge Division
- Heavy Bridge Maintenance
- Maintenance Division
- Computer Services Division
- Programs and Contracts Division
- Planning and Research Division



# How do we get there from here?



**Arkansas is Lucky!**

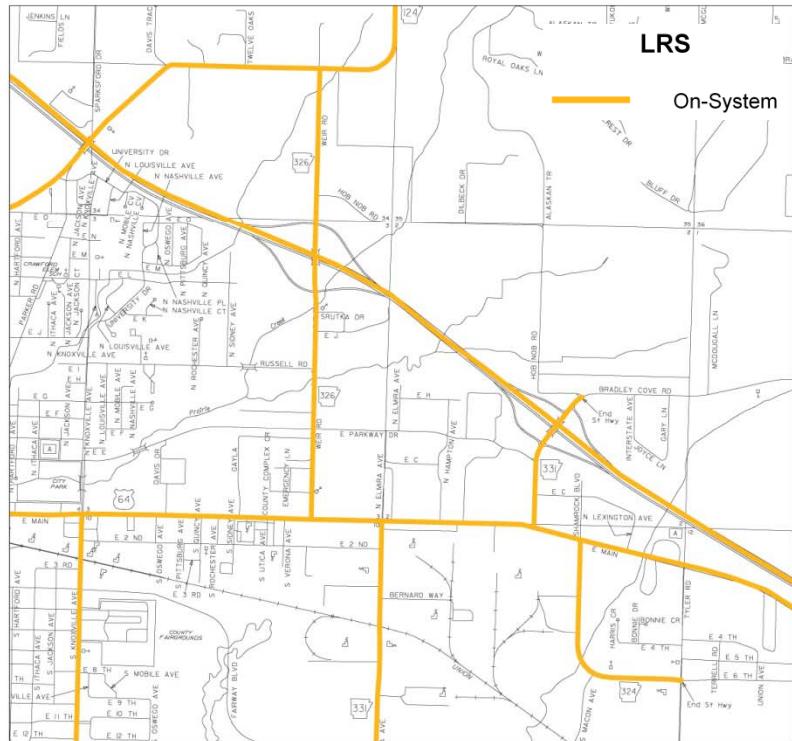
**The Arkansas Geographic Information Office  
coordinated and helps to maintain the Arkansas  
Centerline File (ACF)**

- The ACF is a statewide road centerline file used for 911 addressing and locating, general information such as street names and map generation. The ACF was started in 2002 and was substantially completed in 2010.
- The ACF is continuously updated by local county offices and through coordination by the AGIO.
- Incorporating the ACF into the All Public Roads LRS will be a crucial step to meet the FHWA requirement.

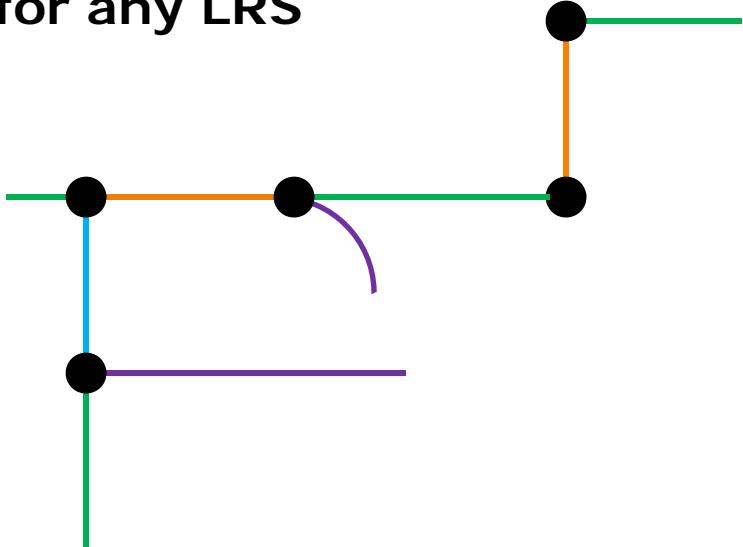
# How do we get there from here?

## Challenges and Obstacles

### # 1 – Combining the two AHTD LRS datasets (On-System and Off-System)



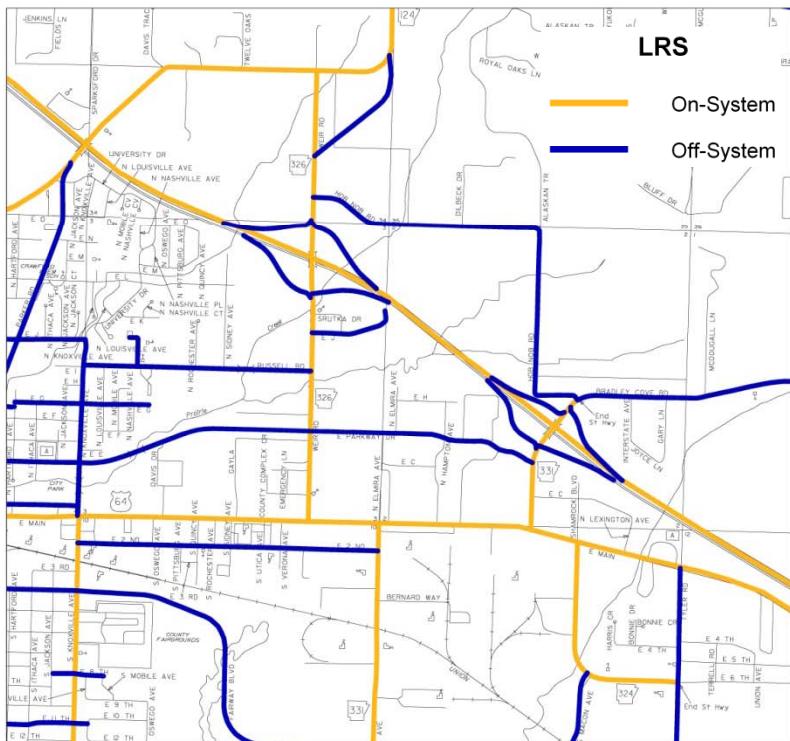
Topology – Imperative  
for any LRS



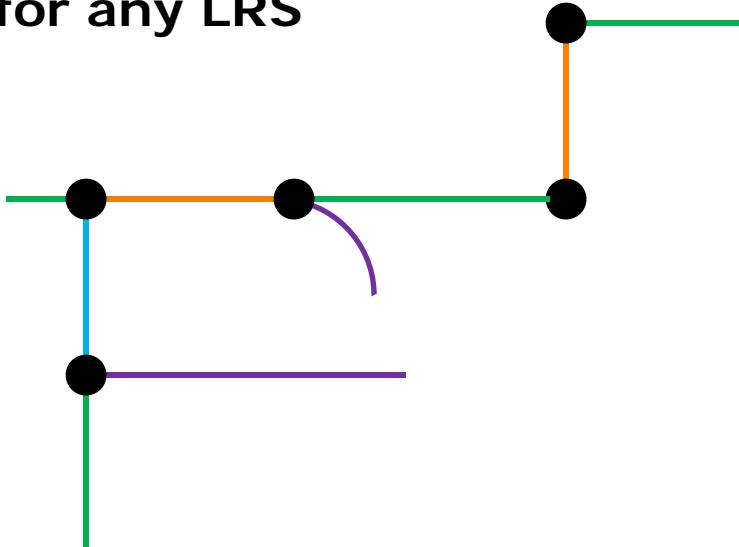
# How do we get there from here?

## Challenges and Obstacles

## # 1 – Combining the two AHTD LRS datasets (On-System and Off-System)



# **Topology – Imperative for any LRS**

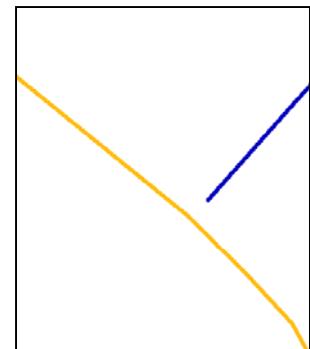
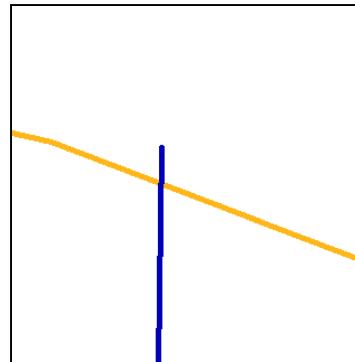
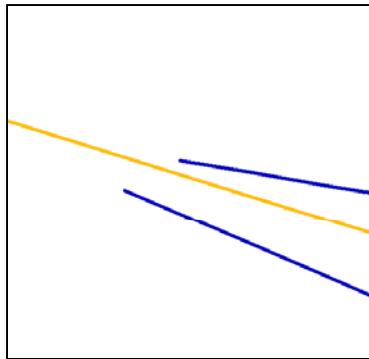


# How do we get there from here?

## Challenges and Obstacles

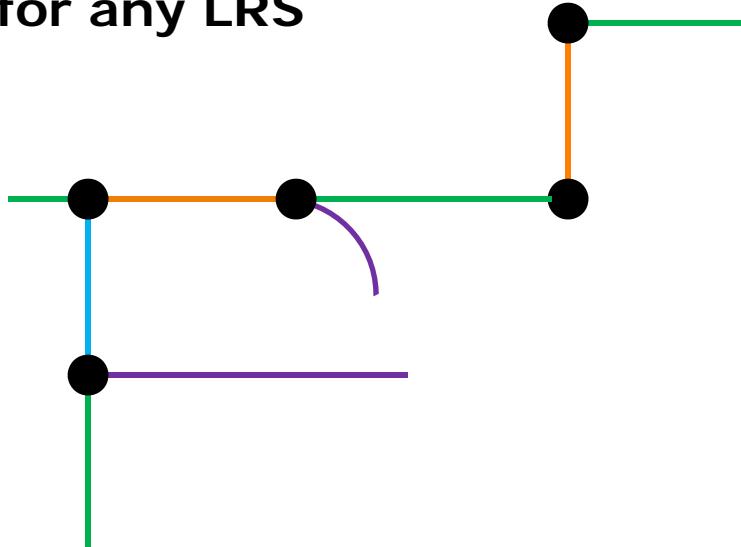
LRS

- On-System
- Off-System



## # 1 – Combining the two AHTD LRS datasets (On-System and Off-System)

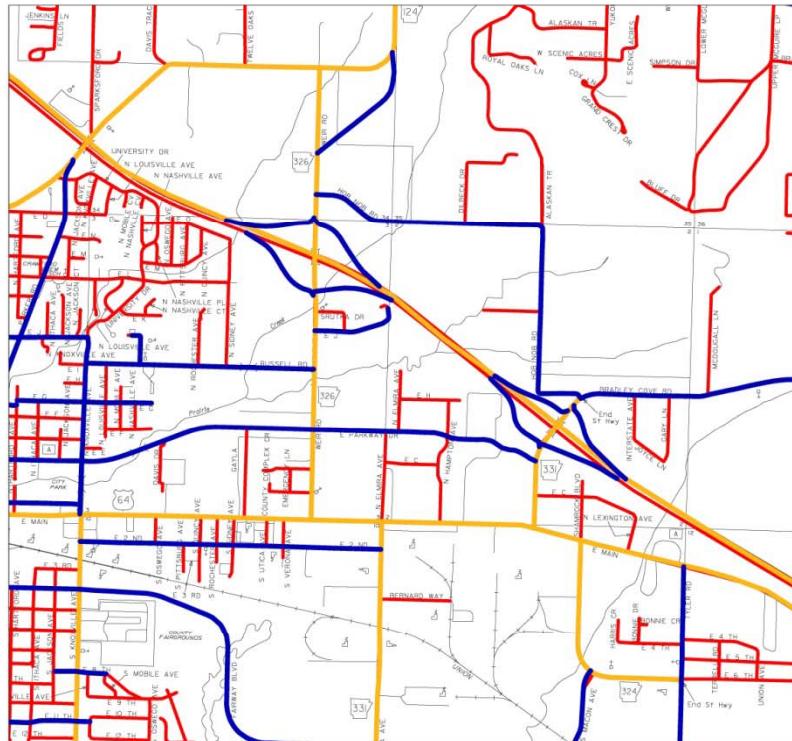
Topology – Imperative  
for any LRS



# How do we get there from here?

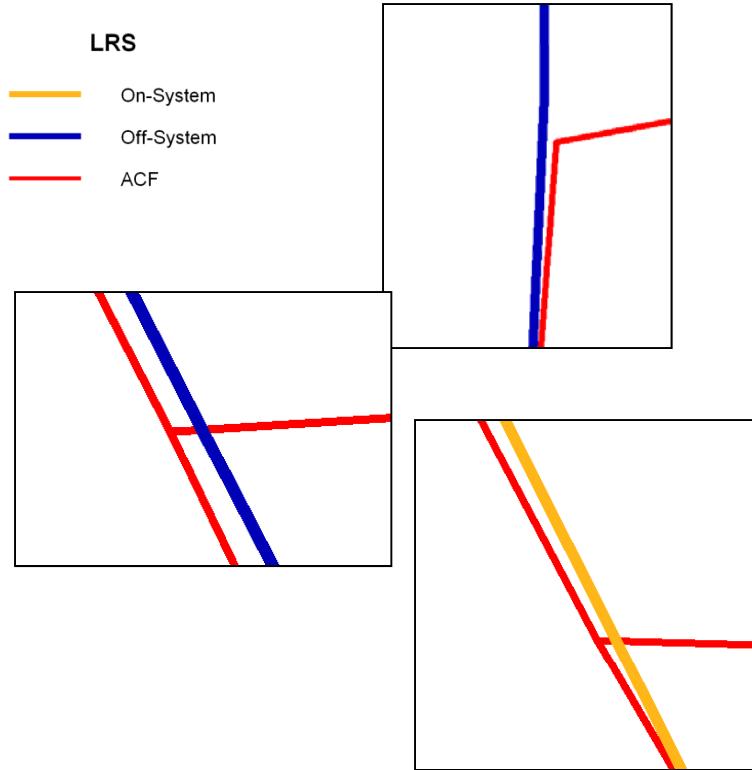
## Challenges and Obstacles

### # 2 – Adding Remaining All Public Roads



#### LRS

- On-System
- Off-System
- ACF



# How do we get there from here?

## Challenges and Obstacles

### # 3 – Dual Carriageway – Log and Anti-Log Geometry and Data on Divided Routes

I-30 – Clark County



# How do we get there from here?

## Challenges and Obstacles

### # 3 – Dual Carriageway (Roundabouts) – Log and Anti-Log Geometry and Data on Divided Routes



65B – Faulkner County

# How do we get there from here?

## Challenges and Obstacles

# 3 – Dual Carriageway (City Streets/County Roads)  
Log and Anti-Log Geometry and Data on Divided  
Routes

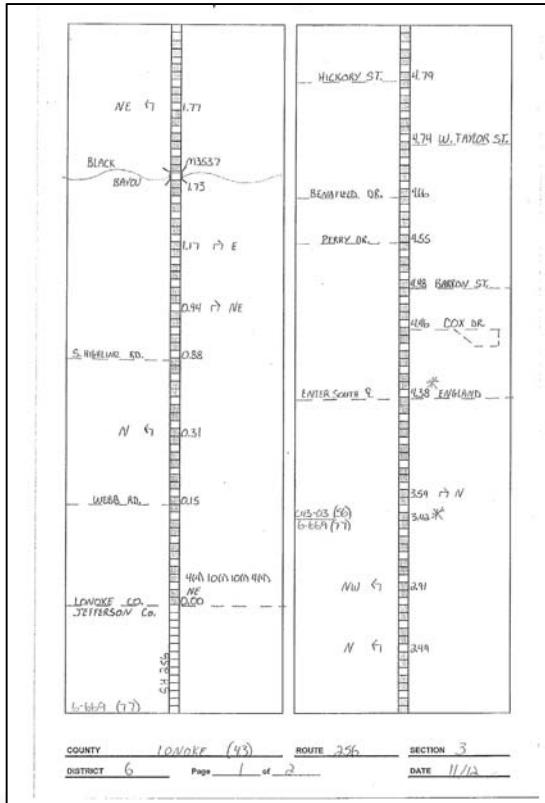
Bentley Blvd. – Pulaski County



# How do we get there from here?

## Challenges and Obstacles

### # 4 – Distance Measurement Instrument (DMI) vs Graphic Length



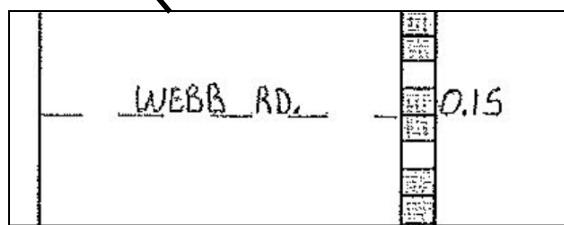
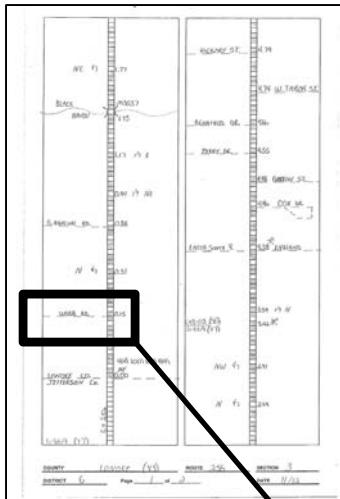
Hwy. 256  
Section 3  
Lonoke County



# How do we get there from here?

## Challenges and Obstacles

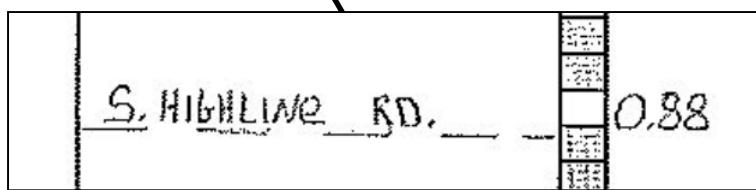
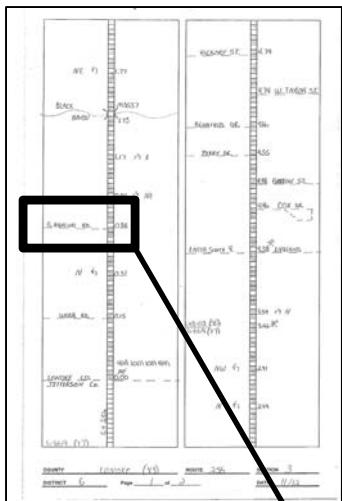
### # 4 – DMI vs Graphic Length



# How do we get there from here?

## Challenges and Obstacles

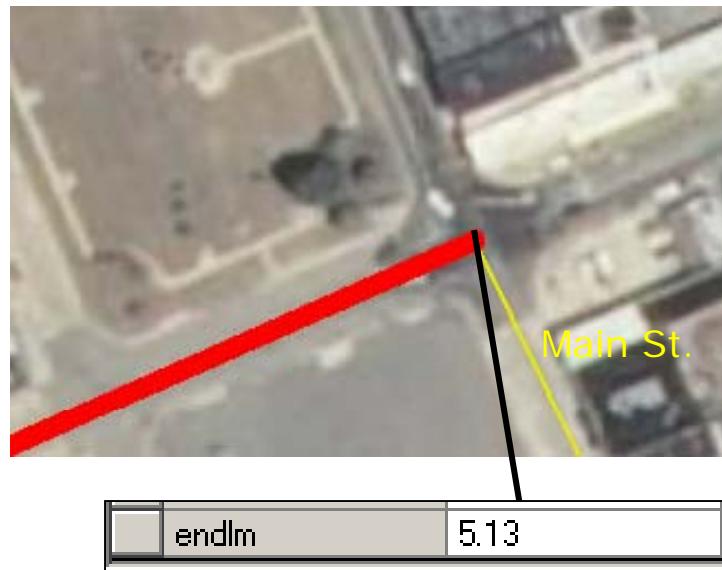
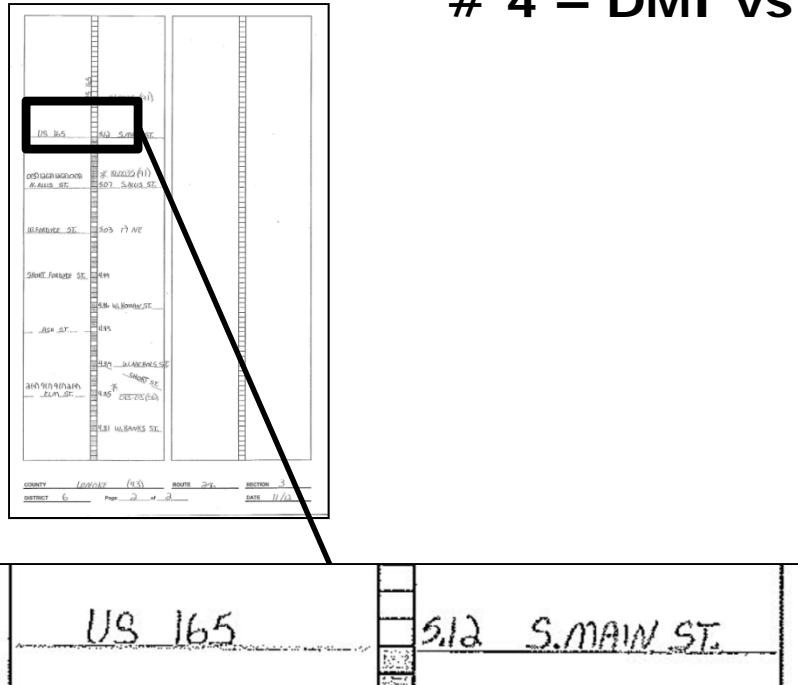
### # 4 – DMI vs Graphic Length



# How do we get there from here?

## Challenges and Obstacles

### # 4 – DMI vs Graphic Length



# **How do we get there from here?**

## **Challenges and Obstacles**

### **# 5 – Include Paved and Unpaved Attributes**

**The plan is to communicate with local governments and provide a system in which they will be able to attribute the line work with the paved/unpaved attribute.**

**The hope is to partner with AGIO to help with that communication!**

# **How do we get there from here?**

## **Challenges and Obstacles**

### **# 6 – The Data Behind the Lines**

**DON'T FORGET THE DATA!**

**The Road Inventory Database will have to keep up with all the changes and additions for proper HPMS submittal.**

**The LRS will included addressing attributes!**

**This process will prove to be the most complex of all the tasks in the development of an All Public Roads LRS**

# How do we get there from here?

## Challenges and Obstacles

### # 7 – Staff Levels

The screenshot shows the official website of the U.S. Department of Transportation, Federal Highway Administration. The header includes the FHWA logo and navigation links for About, Programs, Resources, Briefing Room, and Contact Us. A search bar is also present. The main content area displays the title "MAP-21 - Moving Ahead for Progress in the 21st Century" and a section titled "Mapping". Below this, there are two questions and answers regarding staff levels and surveying/mapping services.

#### Mapping

**Question 2:** What is the significance of the revisions included in section 1517 and will FHWA issue updated guidance?

**Answer 2:** The addition of State "government" in 23 U.S.C. 306(b) indicates that other State agencies outside of the State's transportation agency may provide surveying and mapping services. Engineering and related services performed by other State agencies under the supervision of the STA are eligible for Federal participation, as specified in 23 CFR 1.11. State government staff and equipment shall be utilized in accordance with State law, regulation, policies, and procedures.

<http://www.fhwa.dot.gov/map21/qandas/qapreconstruction.cfm>

# **How do we get there from here?**

**Challenges and Obstacles**

**# 8 – The Tools**

**Software  
(Intergraph, ESRI, SQL Server)**

**Aerial Photography – Availability/Resolution**

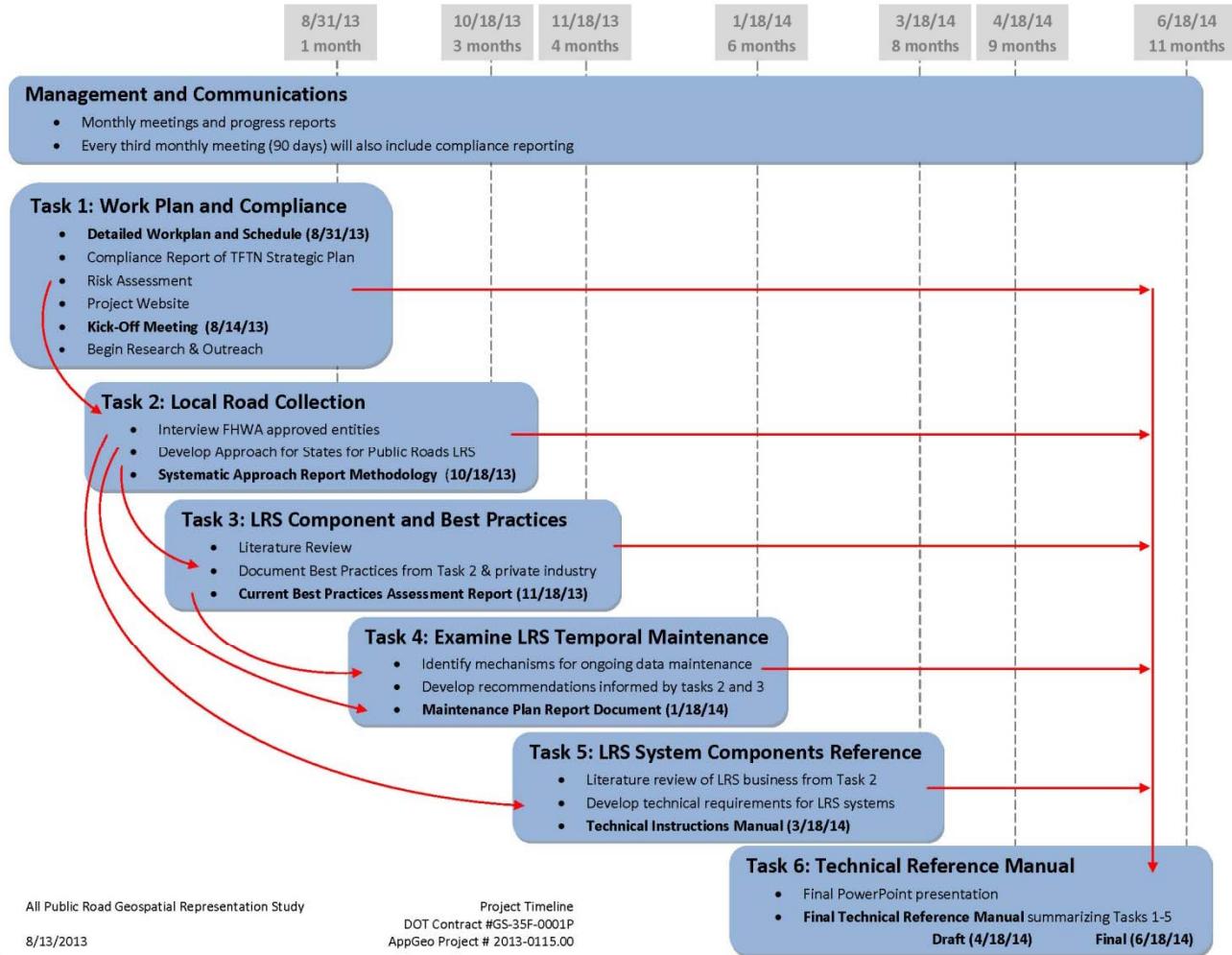
**Platform for other source attribution**

**Waiting on specific guidelines from FHWA**

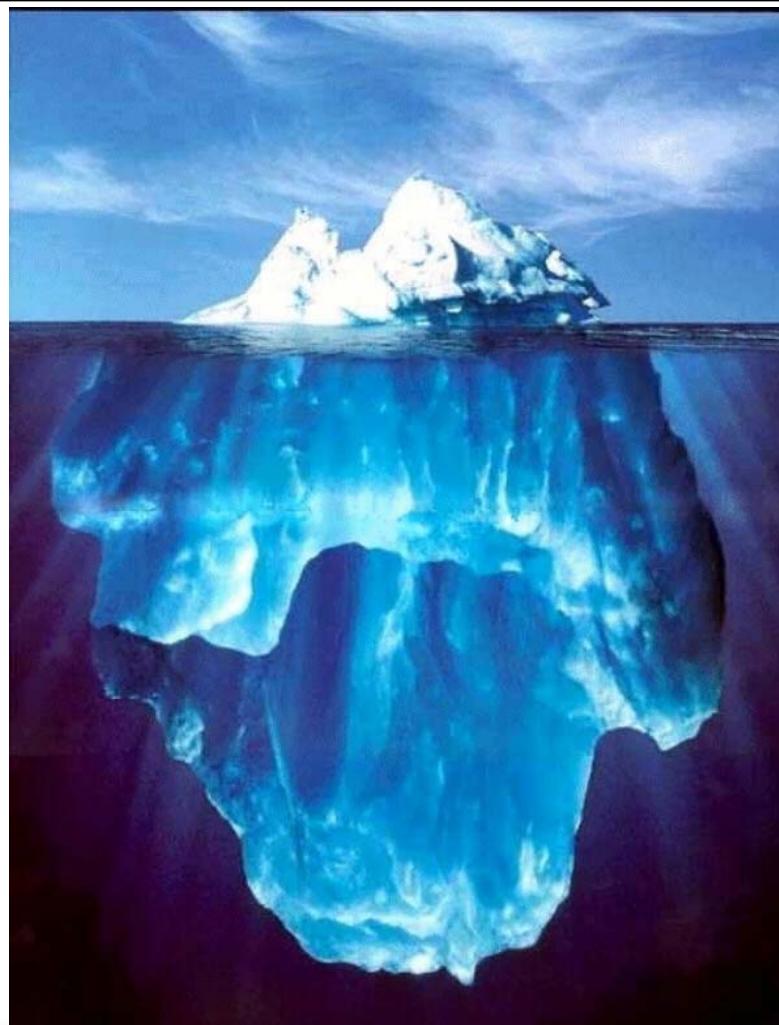
## **More Info:**

- **30% of the States have an All Public Roads LRS in place.**
  - Ohio DOT and Mississippi DOT have shared their data and methodology with us so we can see what they did to implement their All Public Roads LRS.
- **All surrounding states will be contacted to develop a plan for “edge matching” at State borders with LRS line work.**
- **AHTD and AGIO will work closely together to ensure that the all public roads LRS will reduce duplication of effort and promote partnerships with State and local governments in Arkansas.**
- **Arkansas has been asked to be a member of the FHWA All Public Road Geospatial Representation Study.**

# More Info:



# What could we do with an All Public Roads LRS?





THANK YOU

Questions?

