

# ***FULL DEPTH RECLAMATION***

## **A Long Term Solution for Secondary Roads**



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# Presentation Outline

- **What is FDR?**
- **When should FDR be considered?**
- **NCDOT Full Depth Reclamation (FDR) History**
- **The basic FDR process**
- **Project Experiences/Case Histories for 3 Projects**



# What is Full Depth Reclamation (FDR)?

**FDR** is a process whereby both the existing asphalt pavement and underlying materials at a predetermined mix-design depth, usually 8-12 inches, are first pulverized, then mixed with cement, and compacted into a new base course, ready for paving. Design strength gain is achieved by the measured addition of Portland Cement during the mixing of these materials.





# What is Full Depth Reclamation (FDR)?

**FDR** is a **Green Process**: Asphaltic roadway materials are not removed from the project, thereby saving money, time, and landfill space, and not causing further damage to adjacent rural roadways from hauling in new material. The old materials are instead **recycled in place**. Asphalt areas, which are too thick due to repeated patching or overlaying, can be milled off and reused for widening of shoulders on the same project.





## When Should FDR Be Considered?

When a roadway is in such **poor condition** that it may be more economical over the long term to make a new base course out of it than to continually patch and/or overlay it.



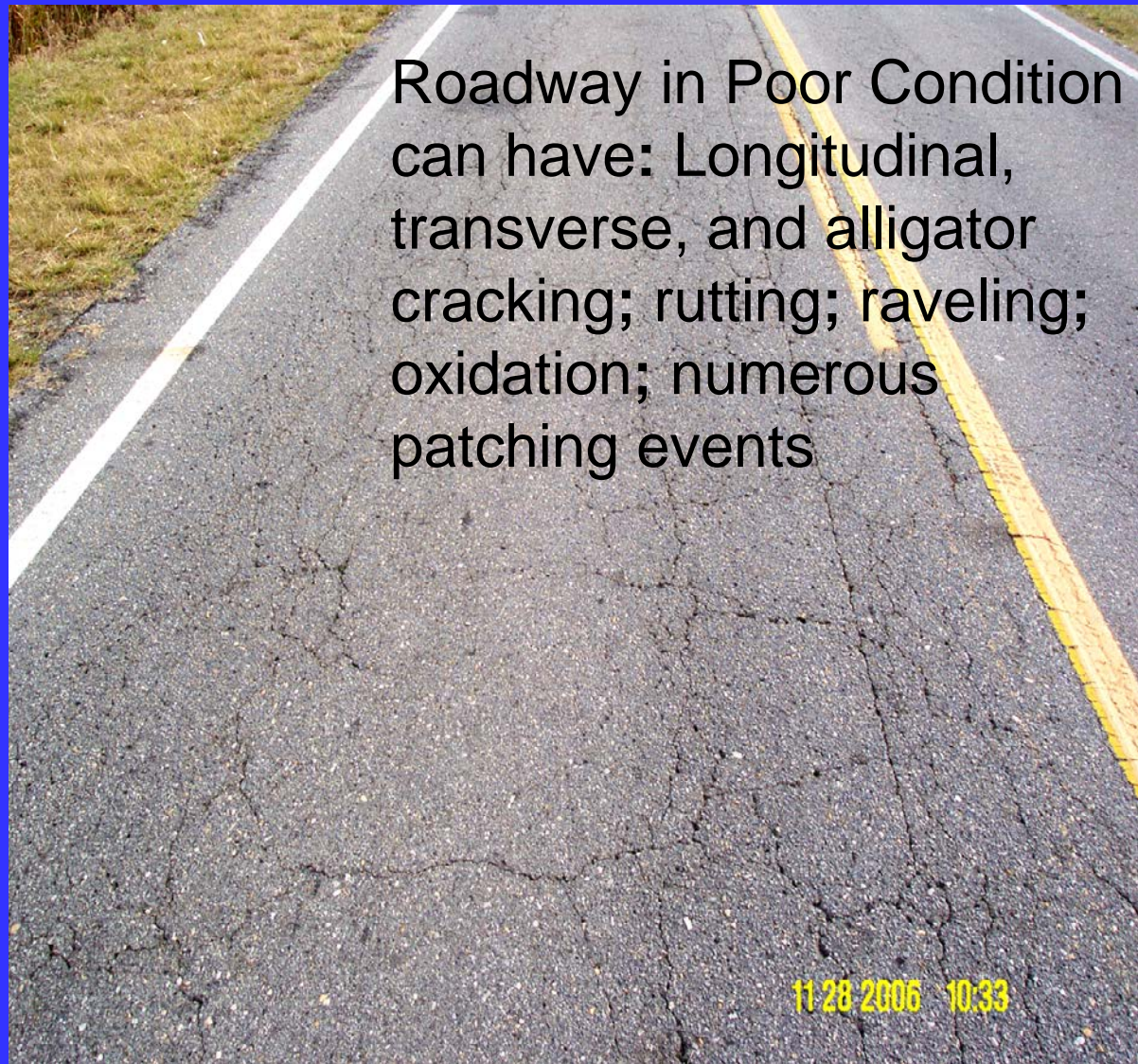
# NCDOT FDR History

- **1<sup>st</sup> FDR completed in 2004**
- **Have performed FDR investigations in 12 of 14 N.C. Divisions**
- **Have investigated 380 miles, while having actually performed FDR on over 137 miles**
- **Project sizes range from ½ mile to 9 miles in length**



# Basic FDR Process: Ingredients of FDR

Roadway in Poor Condition can have: Longitudinal, transverse, and alligator cracking; rutting; raveling; oxidation; numerous patching events







# Basic FDR Process: Steps in FDR

Premix/Pulverize



Spread Cement



Mix/Blend:Dry/H2O



Compact



Grade



Pave

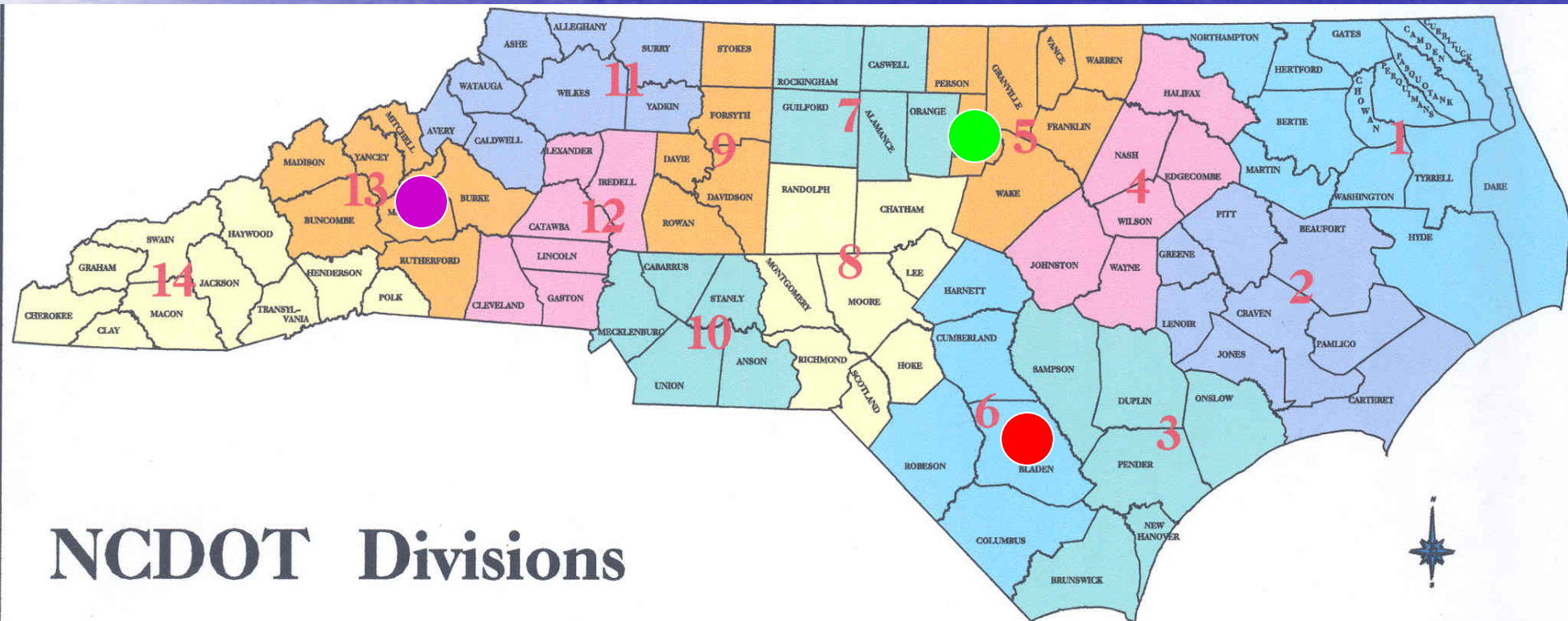


# 3 Full Depth Reclamation Projects:

Old Glenwood Road, McDowell County

Dowd Dairy Road, Bladen County

Kemp Road, Durham County





# Old Glenwood Road, McDowell County

- First FDR Contracted by North Carolina
- Division 13, Mountain Region
- Length = 2.2 lane miles
- Rate = 40 lbs. cement/sq yd
- Mixing Depth = 10 inches
- FDR Performed May 2004





**Old Glenwood Road, McDowell County – May 2004**





**Old Glenwood Road, McDowell County – May 2004**





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**Old Glenwood Road, McDowell County – May 2004**





**Old Glenwood Road, McDowell County – April 2005**





**Old Glenwood Road, McDowell County – Feb 2008**





**Old Glenwood Road, McDowell County – Feb 2008**





**Old Glenwood Road, McDowell County – Dec 2010**





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Old Glenwood Road, McDowell County – Jan 2013



**Before FDR**



**Before FDR**



**After FDR**

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**After FDR**





# Dowd Dairy Road, Bladen County

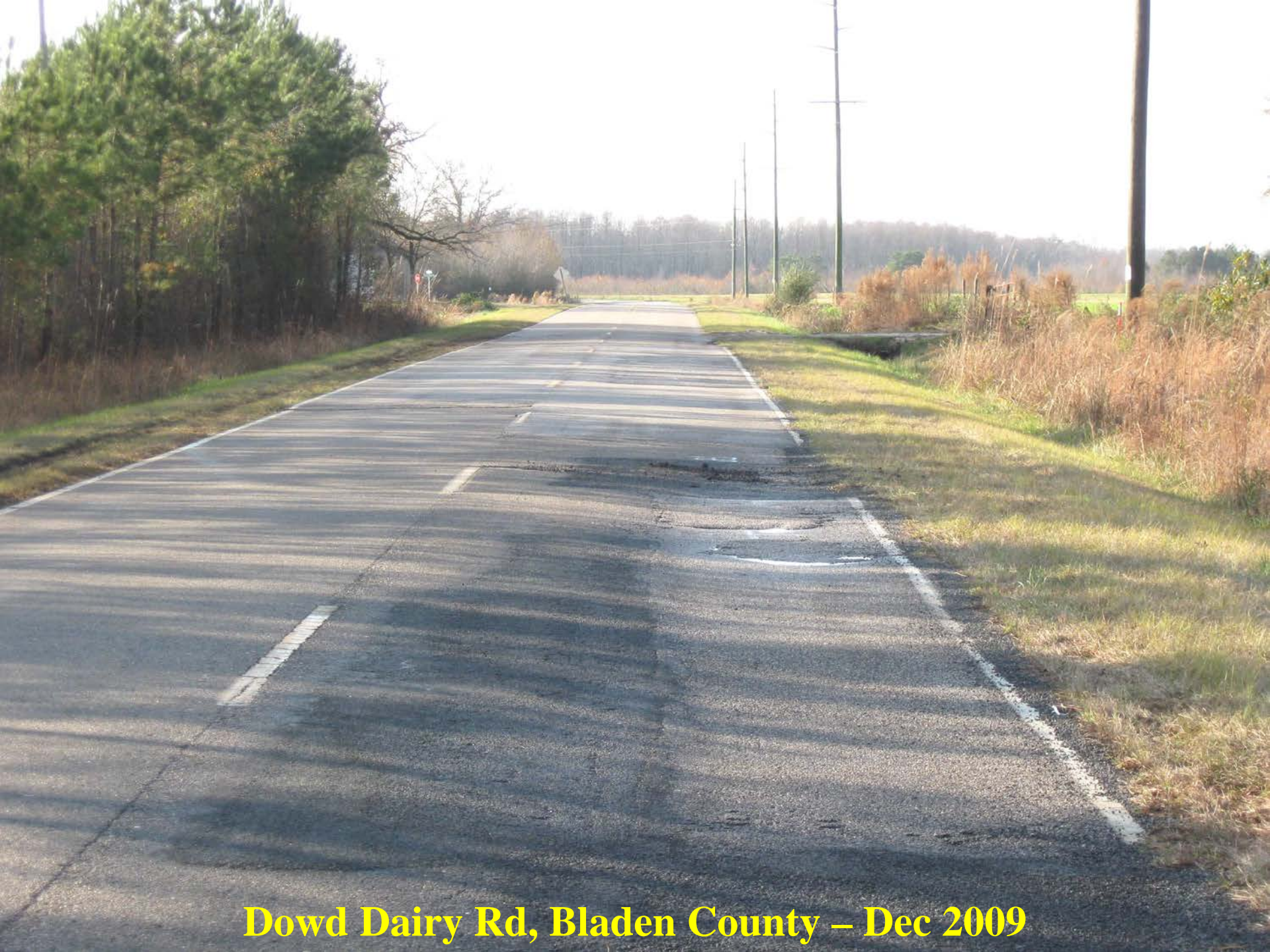
- Division 6, Coastal Region
- Length = 2.0 lane miles
- Rate = 77 lbs. cement/sq yd
- Mixing Depth = 12 inches
- FDR Performed August 2010





**Dowd Dairy Rd, Bladen County – Dec 2009**





**Dowd Dairy Rd, Bladen County – Dec 2009**





**Dowd Dairy Rd, Bladen County – Dec 2009**





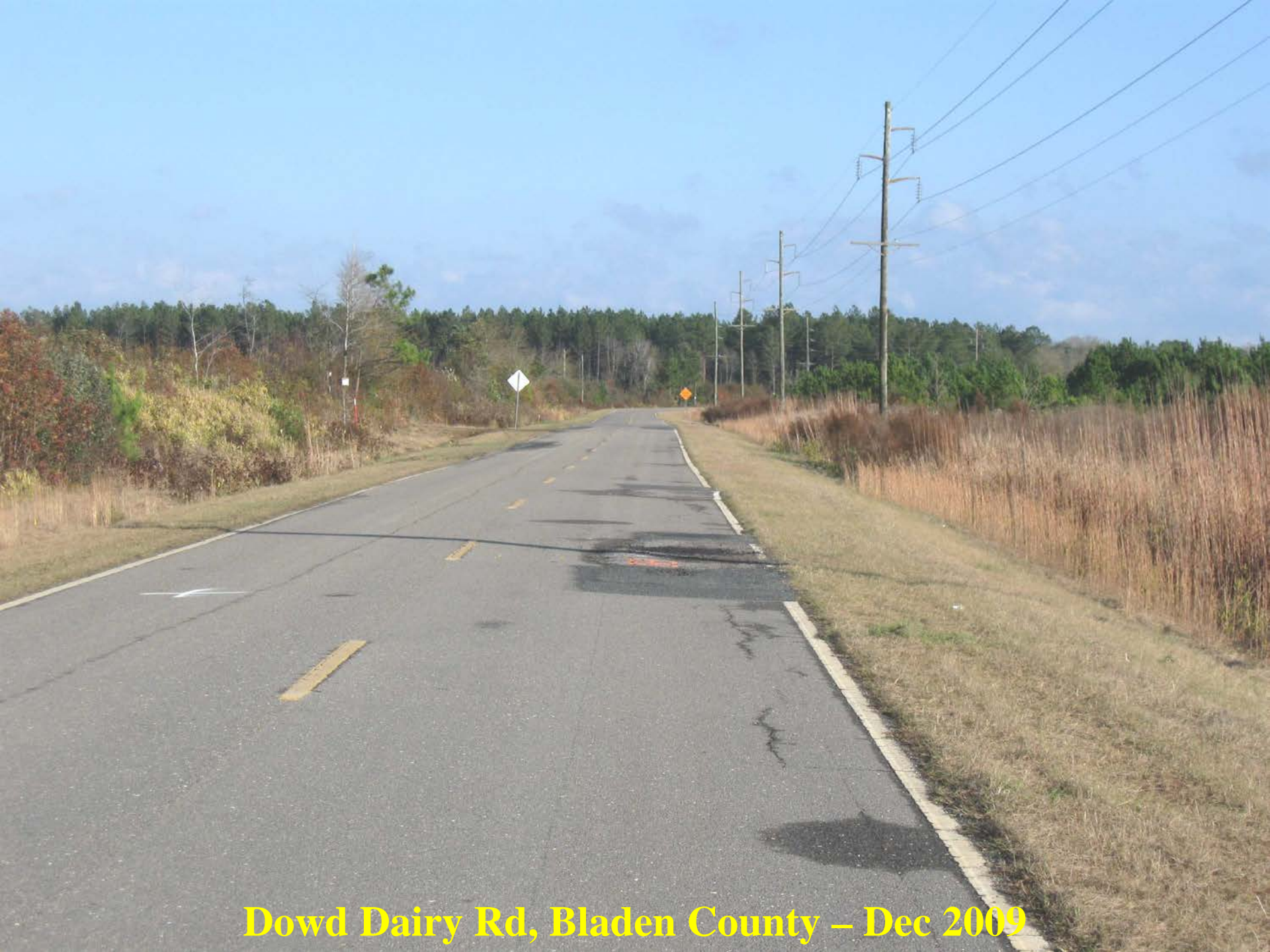
**Dowd Dairy Rd, Bladen County – Dec 2009**





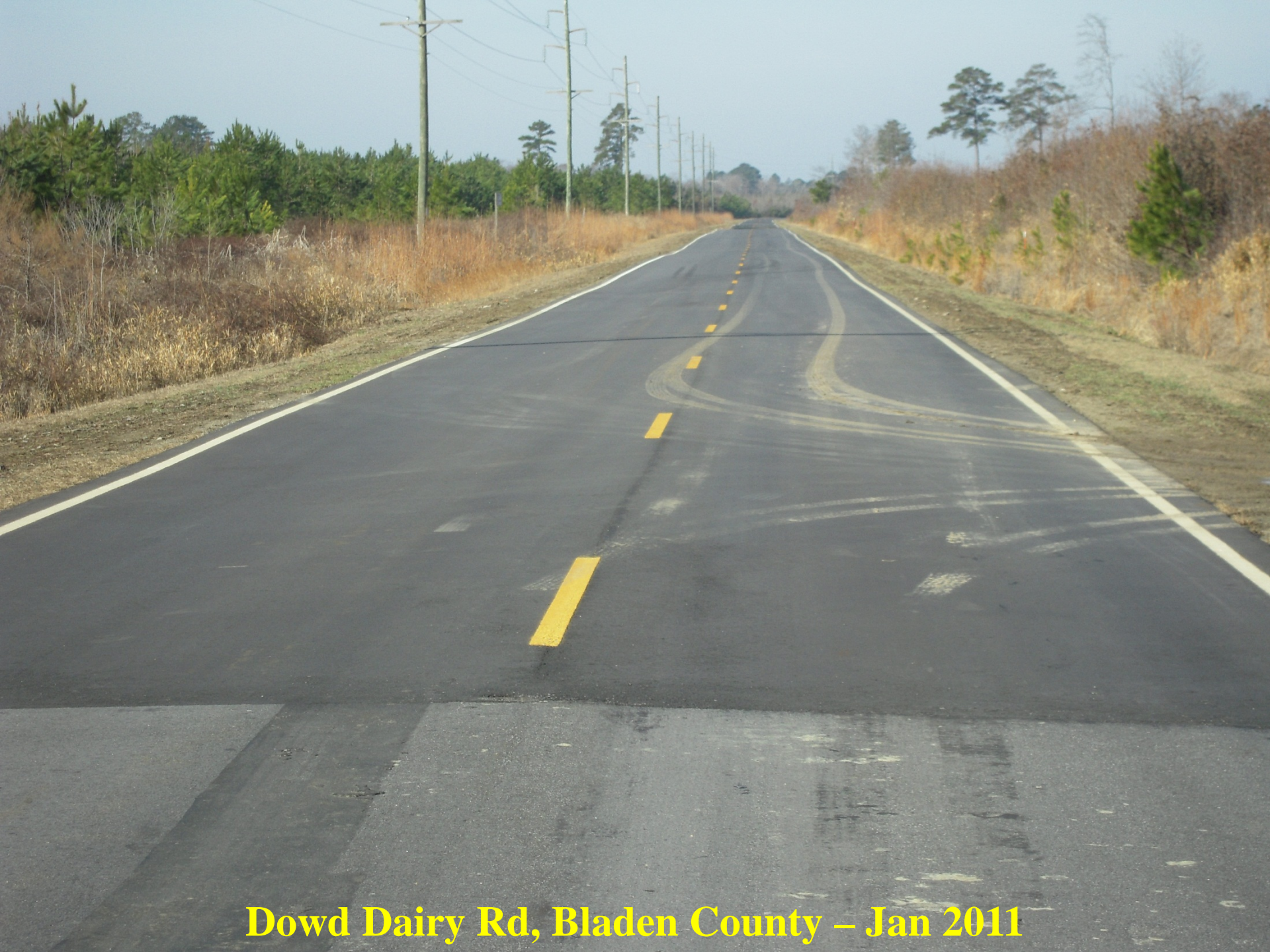
**Dowd Dairy Rd, Bladen County – Dec 2009**





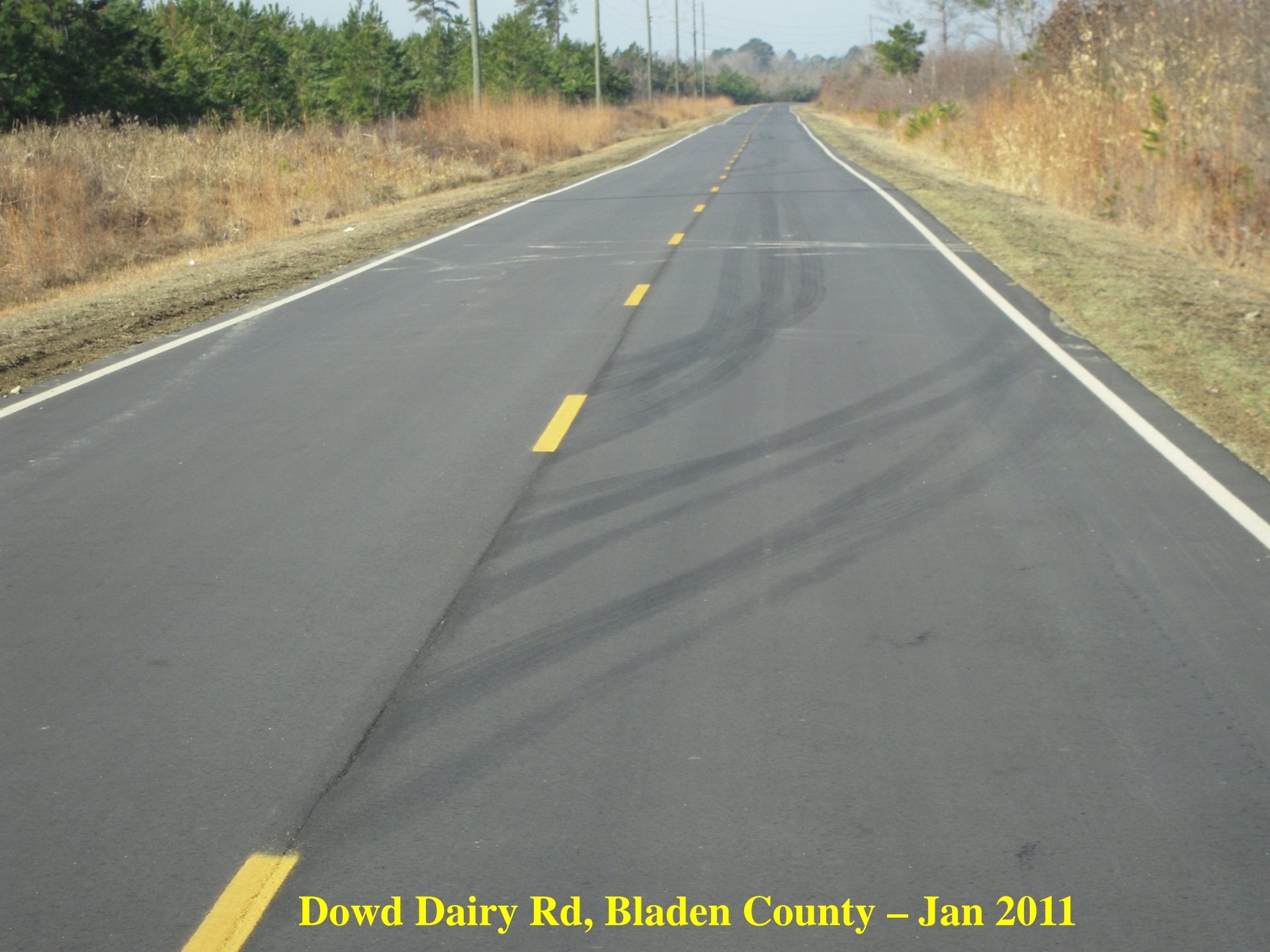
**Dowd Dairy Rd, Bladen County – Dec 2009**





**Dowd Dairy Rd, Bladen County – Jan 2011**





**Dowd Dairy Rd, Bladen County – Jan 2011**





**Dowd Dairy Rd, Bladen County – Jan 2011**

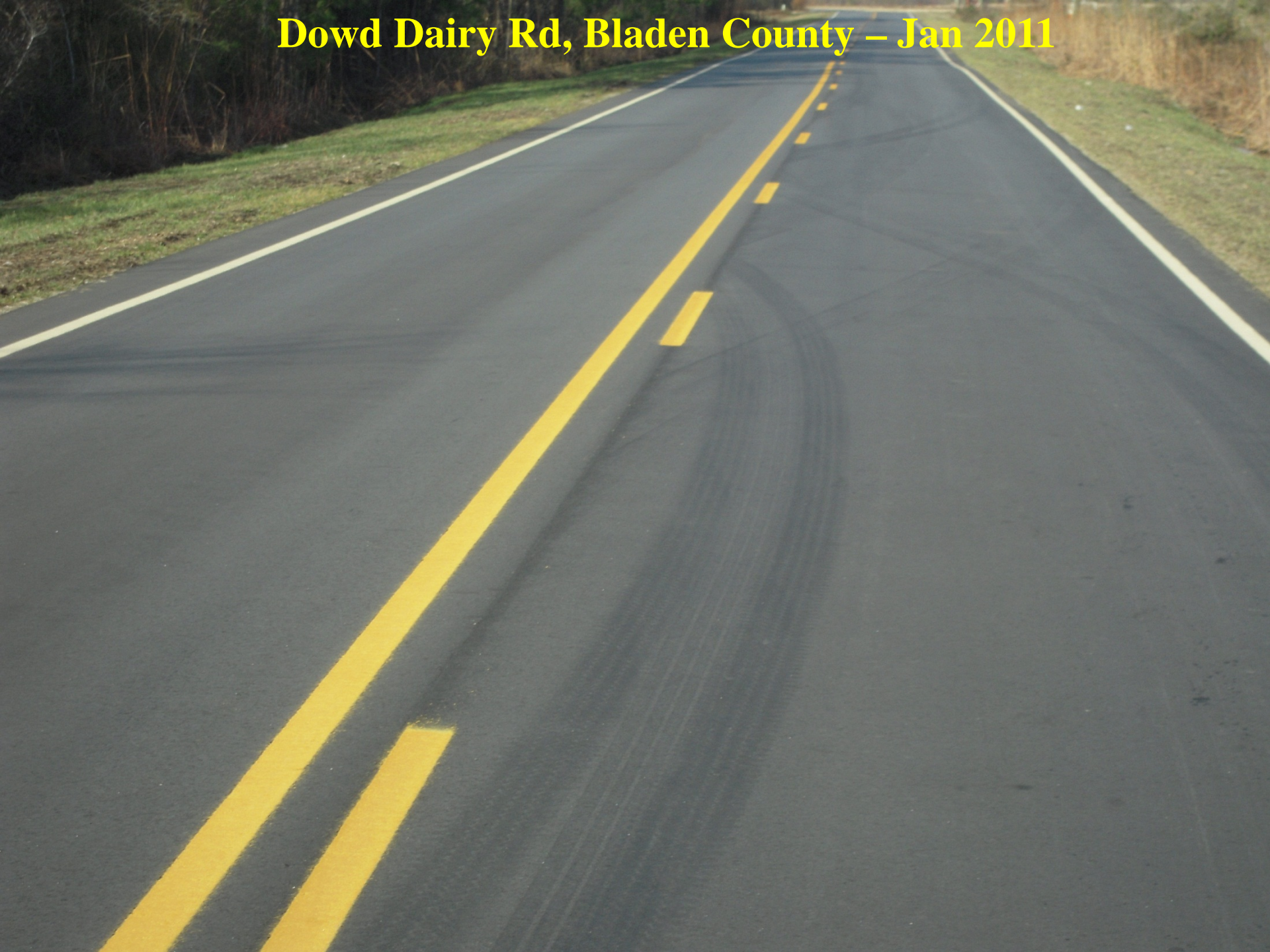




**Dowd Dairy Rd, Bladen County – Jan 2011**



**Dowd Dairy Rd, Bladen County – Jan 2011**







**Dowd Dairy Rd, Bladen County – Jan 2011**





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**Dowd Dairy Rd, Bladen County – Jan 2012**





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**Dowd Dairy Rd, Bladen County – Feb 2013**





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**Dowd Dairy Rd, Bladen County – Feb 2013**



**Before FDR**



**Before FDR**



**After FDR**



**After FDR**





# Kemp Road, Durham County

- Division 5, Piedmont Region
- Length = 2.6 lane miles
- Rate = 22 lbs. cement/sq yd
- Mixing Depth = 10 inches
- FDR performed September 2010





**Kemp Road, Durham County – June 2009**



# Kemp Road, Durham County – June 2009



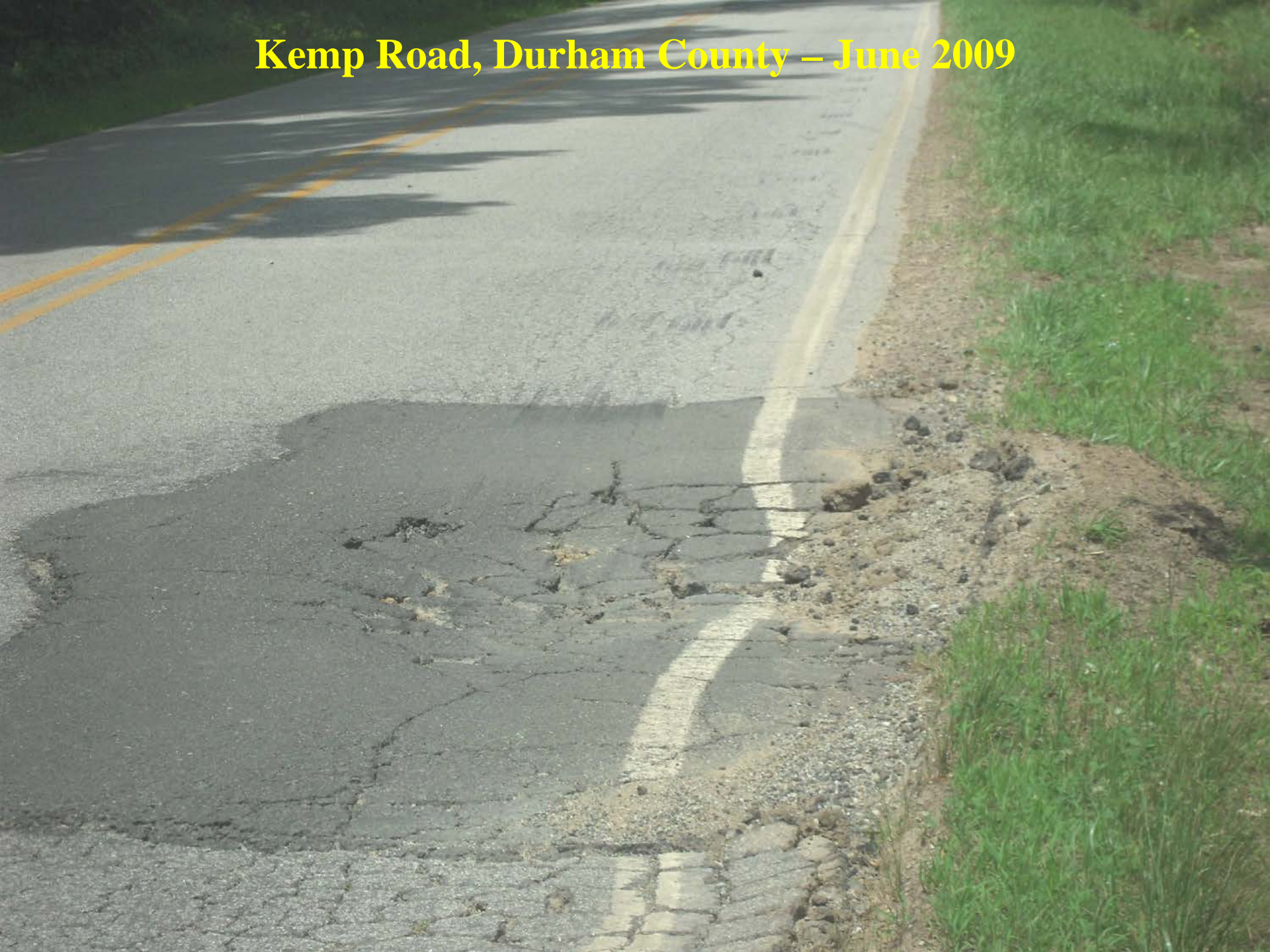


**Kemp Road, Durham County – June 2009**





# Kemp Road, Durham County – June 2009





# Kemp Road, Durham County – June 2009





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# Kemp Road, Durham County – June 2009



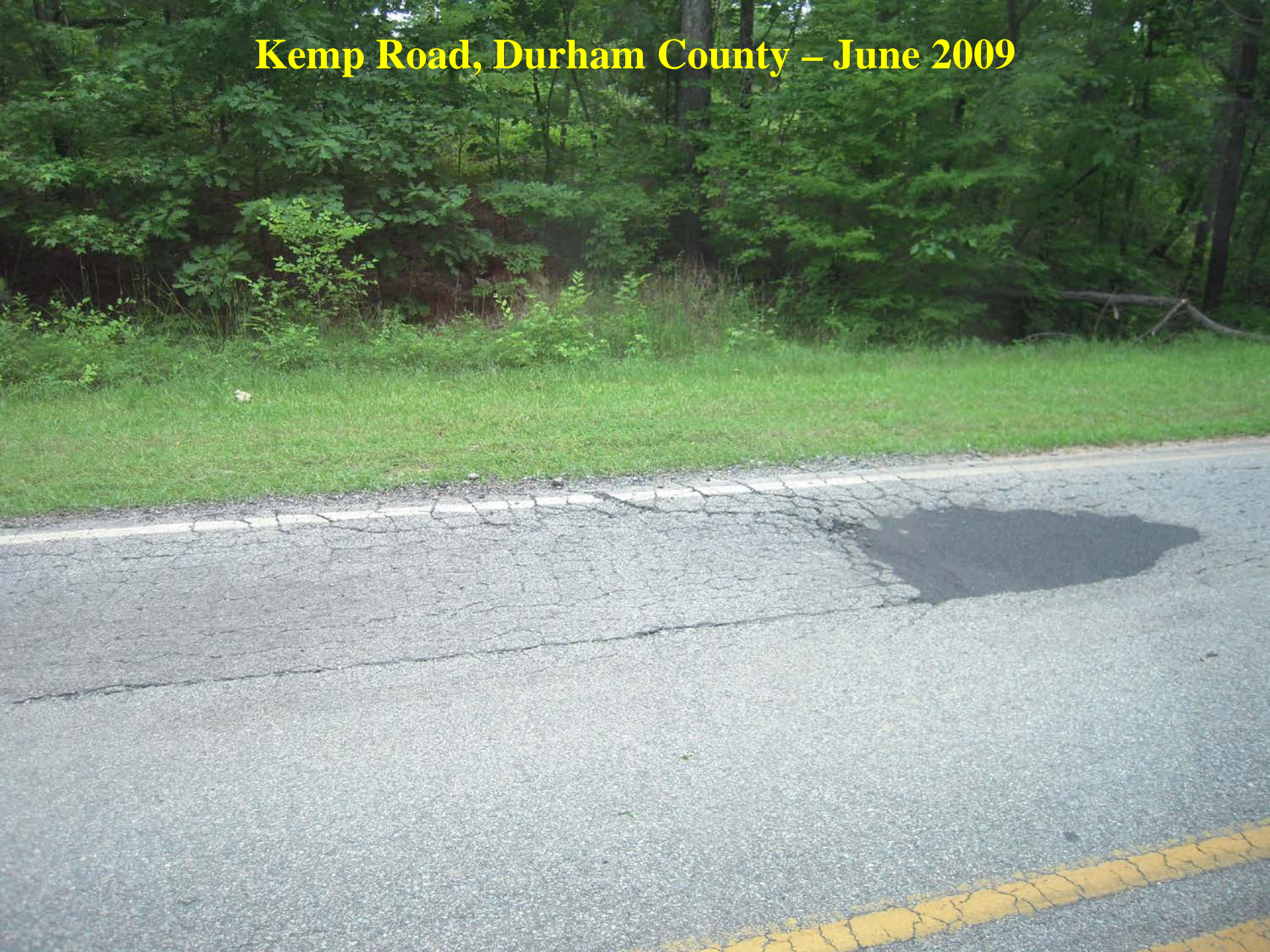


# Kemp Road, Durham County – June 2009





# Kemp Road, Durham County – June 2009







**Kemp Road, Durham County – June 2009**





**Kemp Road, Durham County – Jan 2011**





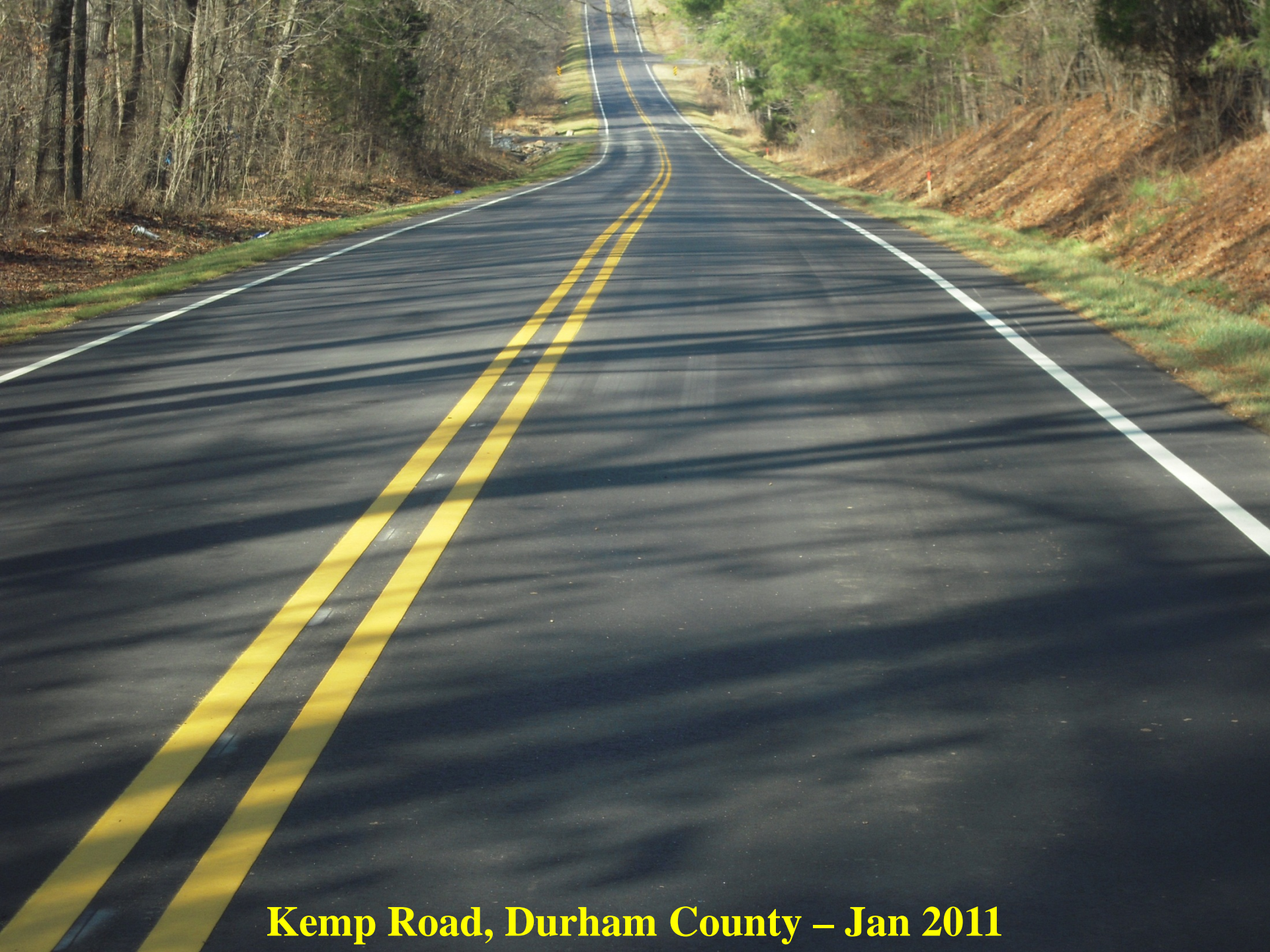
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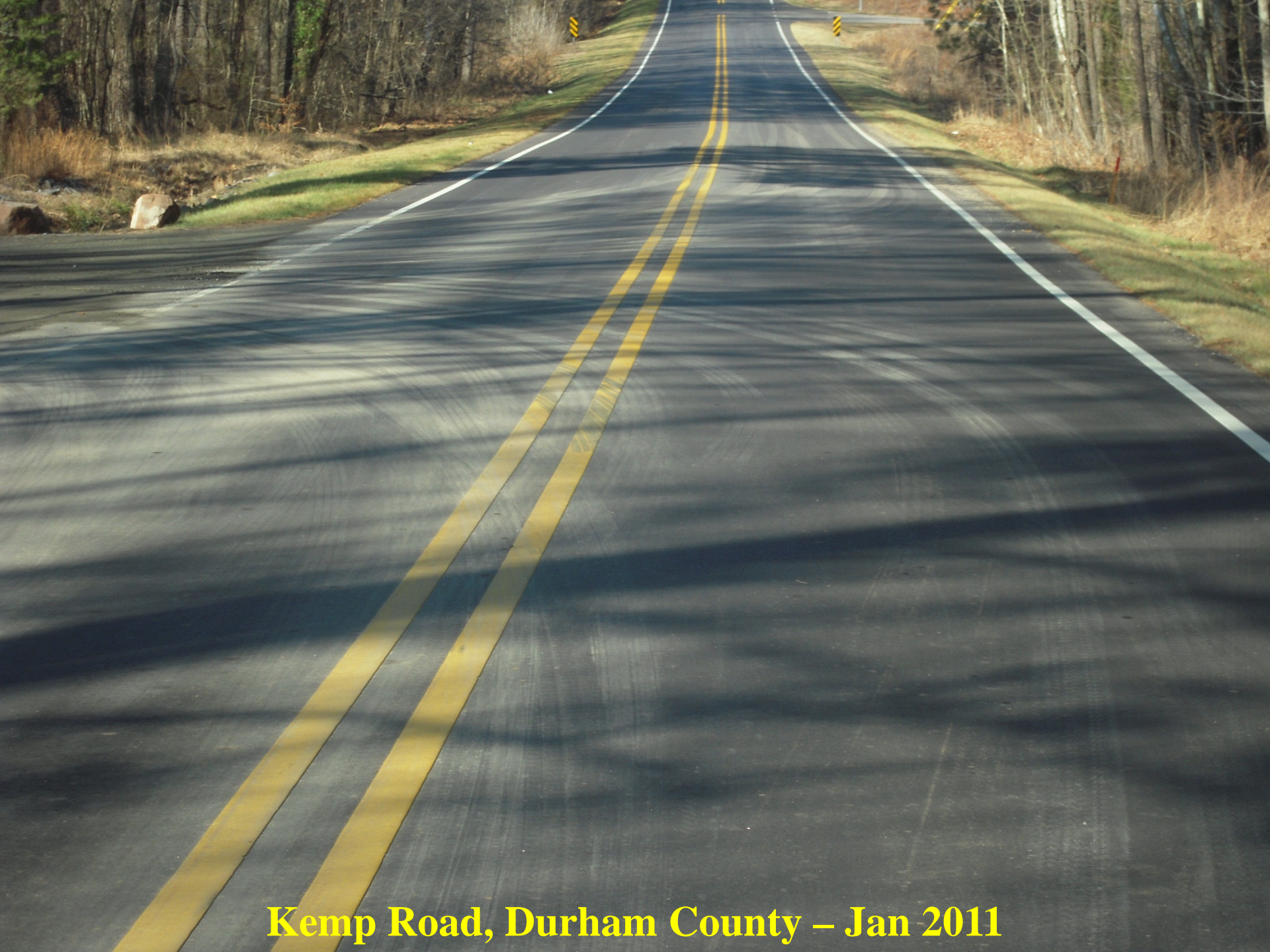
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**Kemp Road, Durham County – Jan 2011**





**Kemp Road, Durham County – Jan 2011**



# Kemp Road, Durham County – Jan 2012



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**Kemp Road, Durham County – Feb 2013**



# Kemp Road, Durham County – Feb 2013

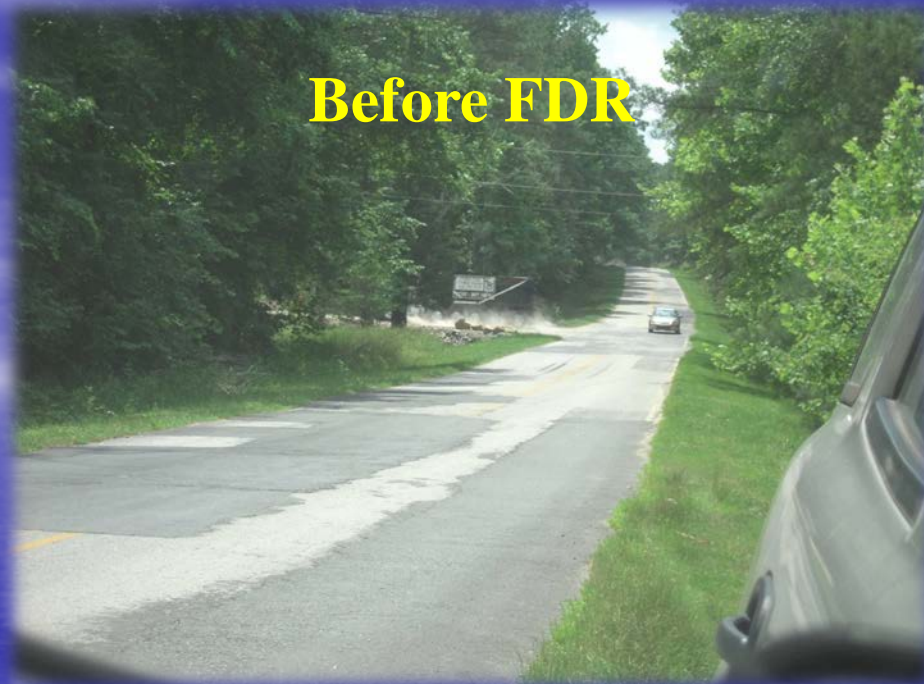
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**Before FDR**



**Before FDR**



**After FDR**



**After FDR**





# QUESTIONS?

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- **Please find FDR Specifications at the [Geopavement Website](http://www.ncdot.org/doh/preconstruct/highway/geotech/contractserv/geopavement/):**  
**<http://www.ncdot.org/doh/preconstruct/highway/geotech/contractserv/geopavement/>**
- **Located under Geopavement Resources**
- **Then click FDR With Cement – Section 541**