

# Inspection of Timber Bridges in the Southern US

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## Summary

Nineteen timber bridges were selected in Alabama, Mississippi, and Tennessee for inspection for the field performance of timber bridges study. All bridges selected had both super and sub structures manufactured out of Southern pine, treated with various preservatives and installed at different points in time. Alabama had four bridges in the study followed by Tennessee with seven bridges and Mississippi with a total of eight bridges. All of the bridges inspected in this study were built using a sawn lumber stringer system.

**Keywords:** Mississippi, Alabama, Tennessee, Timber, Wood, Bridges.

## 1. Introduction

### 1.1 Problem

Timber bridges are widely used in the Southern US, but their use is often related to the county engineer's preference for construction material and cost. Many of the engineers do not know the life cycle of the bridges and may specify bridges manufactured of other materials in place of wood because of a lack of information. The purpose of this study was to examine the condition of bridges in service, and their likely longevity.

In an effort to research timber bridge populations and information pertaining to these bridges, an excel macro was programmed to label and sort through the National Bridge Inventory (NBI) data. The program is similar to what is used on the [www.nationalbridges.com](http://www.nationalbridges.com) website, but differs by including additional information such as average daily traffic, deck type, superstructure and deck rating, bridge width, number of lanes, etc. Having more of the NBI data available in one location has proven useful in narrowing down bridge candidates. From the NBI data, nine potential clusters throughout Mississippi, Alabama, Georgia, South Carolina, North Carolina, and Tennessee have been identified and are shown in Table 1. These clusters account for both American Wood Protection Association hazard zones 4 and 5 as well as bridges in rural and urban environments.

The clusters were primarily being targeted because of the relatively high number of timber bridges located in a single county or neighbouring counties in their respective states.

*Table 1: Potential Bridge Clusters*

Potential Cluster	State	Counties	Timber Bridges in County or Counties	Median Year Built	Median Superstructure Rating	Median Bridge Rating	Median Average Daily Traffic	AWPA Zone
1	Mississippi	Hinds	28	1992	7	39	650	5
2	Mississippi	Attala, Choctaw, Montgomery, Oktibbeha, Webster, Winston	109	1967	5	28	50	4
3	Mississippi	Lafayette	68	1992	7	46	55	4
4	Alabama	Pickens, Tuscaloosa	105	1980	7	50	50	4
5	Tennessee	Crockett, Gibson, Henderson, Madison	136	1970	6	53	55	4
6	Georgia	Colquitt, Mitchell, Thomas	78	1980	5	26	140	5
7	Georgia	Bryan, Liberty	78	1993	7	95	500	5
8	South Carolina	Laurens, Newberry	36	1982	6	30	126	4
9	North Carolina	Cherokee, Clay, Graham, Haywood, Jackson, Macon, Swain, Transylvania	275	1961	7	52	220	4

## 1.2 Bridge selection

The number of clusters was reduced from above down to three clusters. One of the clusters was Pickens County, Alabama, a second cluster was chosen in Lafayette County, Mississippi and the third cluster was located within the two counties of Crockett and Madison, Tennessee. All of the bridges selected are of a sawn lumber stringer construction and had varying deck materials and road surface materials. The bridges in this study were all found in AWPA decay zone 4. A total of nineteen bridges were inspected using non-destructive techniques.

## 2. Inspections

### 2.1 Methods used

All bridges were examined ocularly first to identify obvious issues or deficiencies. In many cases this was the method used to find mechanical damage and seepage through the deck onto the stringers below. After the initial inspection the bridge was labelled using sidewalk chalk to identify stream flow, the beginning and end of the bridge, and to number and label the parts of the bridge. Once this was complete, the use of a moisture meter, microsecond timer, and resitograph along with a hammer were used to closely inspect the integrity of the wood.

### 2.2 Examples

#### 2.2.1 Alabama

All four of the bridges in Alabama were of similar construction, utilizing creosote treated stringers, caps, and pilings. Figure 1 shows an example of the bridge construction in Pickens county Alabama. The bridges were constructed between 1986 and 1997.



Figure 1. Alabama bridge 14268

#### 2.2.2 Mississippi

All eight bridges inspected in Mississippi were treated with CCA and had similar construction. Figure 2 is an example of the timber bridges found in Lafayette county Mississippi. The bridges ranged in age from 22 years in service to only 16 years in service.



*Figure 2 Mississippi bridge 77*

### 2.2.3 Tennessee bridges

The seven bridges examined in Tennessee were of a similar construction of those in Mississippi. Chromated Copper Arsenate treated Southern pine sawn stringer construction, with similarly treated piles and caps. The decks were varied in that some were concrete poured in place and others were lumber based. The bridges in Tennessee that were inspected were built between 1960 and 1974 with improvements made over that time.

## **3. Discussion, Conclusions and Acknowledgements**

### **3.1 Discussion and Conclusions**

The purpose of inspecting bridges in the Southern US was to collect data for the Field Performance of Timber Bridges: A National Study was to examine how timber bridges have held up over time. The timber bridges inspected in Alabama, Mississippi and Tennessee were all of similar sawn stringer construction, spanning both active streams and relief streams that help reduce flooding. All of the bridges that were inspected had been in place for more than two decades and were still ranked well using the NBI guidelines indicating that timber bridges hold up better than previously considered.

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