

Historic Structures Speak to Careful Observers: A Case Study of Smith Truss Bridges

Abstract

It should go without saying that we are unlikely to do a good job of conserving historic artifacts without a thorough understanding of the artifacts' historic characteristics. In the case of bridges (and industrial structures in general) this demands a thorough grasp of the technology used by the builders, knowledge of how the structure was designed and built. Engineers called on to repair and preserve old bridges are often satisfied with measurements and tests that provide input data for computerized structural analysis. Yet there is far more that careful observation can reveal about historic structures.

The author illustrates this point using as examples the 1876 Cataract Covered Bridge in Owen County, Indiana, for which he designed repairs, and other wooden Smith truss bridges in the states of Indiana and Ohio. Robert Smith (1833-1898) patented this truss type in the 1860s, and he and others built hundreds of bridges using this design over the next 30 years.

Covered wooden bridges, built in great numbers in the United States and Canada during the 19th and early 20th Centuries, are generally seen as a late preindustrial technological development, with roots in the medieval craft of timber framing. Long popular with tourists, they are thought of as structures hand-hewn from trees cut on the site, and are associated with empirical (trial and error) design, hand craftsmanship and use of local materials.

Examination of the wood species and geometry used in Smith trusses, the dimensions and finish of the timbers, and other characteristics, reveals something very different. Robert Smith, it turns out, is probably the first builder to prefabricate bridges. He made his bridges in an urban factory using heavy machinery and imported timber, then sent them out via railroad. His designs allowed for rapid fabrication and assembly by relatively unskilled labor. We are more likely to associate such construction with the iron bridges of the late 19th Century industrial age. Indeed, research reveals the Smith Bridge Company also built (and in its later years only built) metal bridges.

Careful observation, in short, revealed much about Smith trusses that differed from the conventional wisdom about covered bridges. This had a significant effect on the repairs the author designed for the Cataract Bridge.