

INTRODUCTION

Bridge builders seem to have been an anonymous group. Their products are described as finished objects, artifacts of industry and commerce, symbols in our cities and landscapes. The bridges might have appeared without the agency of man. Most studies are directed to the structures - and general histories, descriptive lists of those in a particular area, and in-depth analyses of individual projects. Perhaps this is the result of the nature of the business, for, when the construction was finished, the crews departed for the next job, the equipment was hauled away, and the only reminder of the builder was his nameplate, which often has been removed or destroyed. Perhaps this is why the completed bridges now seem to have appeared overnight. There has been little study of the men, the companies, and the methods of fabrication and erection. This guide is concerned with the organizations that signed the contracts, coordinated all the parts of the job, took the risks, and produced the spans. It is intended to be of assistance to the surveyors of old bridges, to those who study the history of technology, and to the students of nineteenth-century industry.

Until the expansion of the railroads and the introduction of the Howe truss in the early 1840s, timber bridges were constructed by traveling master builders such as Lewis Wernwag and Theodore Burr or by local craftsmen who also erected factories and mills. Most, if not all, of the material was obtained close to the site, and the fabrication was done there. The guide begins at that time, the early 1840s, and ends with the close of the nineteenth century. The Howe truss, with its small but vital amount of iron, began the move to industrialization as firms such as Boody, Stone in Massachusetts and Stone and Boomer in Chicago established shops for fabricating the materials, which were shipped to the erection site. The next step, iron bridges, required foundries and fabricating shops to form, drill, assemble, and rivet the pieces before shipment. This off-site work in turn necessitated designs, drawings, and obtaining the materials from rolling mills and other suppliers. These new activities marked the progression from a craft to an industry. The guide covers the most dynamic period of the industry's history. The changes included the replacement of wood by iron and then the use of steel, development of analytical methods of design, emergence of the independent practice of bridge engineering, the growth of the domestic iron industry, and the evolution of business organizations. This last was climaxed with the formation of American Bridge Company in 1900 with its control of half of the nation's fabricating capacity. With the exception of American Bridge's later acquisitions, no effort has been made to record any activities of the twentieth century.

The Directory shows that there was no single pattern for the companies or the proprietors. Some concerns were stable, continuing operations such as Keystone Bridge, which lasted for thirty years, or Detroit Bridge and Iron, which ran for forty, while others existed only a short time. Some men spent their working careers at one place, and others, as shown in Appendix D, made many moves. There was an equal diversity in operations, with some firms performing all the functions, extending sometimes to the foundations, and others subcontracting much of the work. Some of the companies had their own proprietary designs for bridges. Often the patentee of such a design had formed the company to sell and build his idea of a proper truss. The demands of the expanding economy, the ease of entry into the business, the moving about of managers and engineers with

the resulting diffusion of information, and the greater availability of materials all contributed to the development of the industry and its great diversity.

The data can be used to locate the builder of a particular bridge, to analyse the growth of the industry in terms of number of companies and geographic distribution, and to examine the patterns of company formation, growth, and longevity. It also suggests other questions that could be addressed only in a more complete study. Why did Ohio have such a large number of small to medium size fabricators? Why was New England's capacity so small? How did companies obtain work so far from their shops - Detroit Bridge and Iron built in every state, and Berlin (Connecticut) Iron Bridge Company sent four bridges to Indiana and seven to Texas? Why were branch plants unsuccessful? Zenas King made two attempts, and Union Bridge failed to keep both of its shops operating.

The Directory includes companies that built bridges or advertised to do so, and those concerns that erected at least one major bridge even though, as in the case of John Roach, it was not their usual activity. It also lists, until the mid-1880s, the engineers who advertised as bridge builders, signing contracts for complete projects, making the designs, and subcontracting the actual construction. Some large bridges were built in this manner, but gradually the practice disappeared as the engineering profession developed. Another group is composed of the companies listed in national directories as 'bridge builders'. Undoubtedly this included some that had no shop facilities or built only minor structures and those that did only foundations or masonry, but there is no feasible way of editing those lists at this time. The coverage of the business directories was uneven and seems to have varied with the diligence of their local agents. In some instances well-established companies were omitted and in others it is most doubtful that so many real bridge builders could have existed in the area covered. The American Iron and Steel Association directories of the 1890s were more selective and also provided fabricating capacities. The companies included in the AISA publications are marked with an asterisk (*), and the capacity data are given in Appendix A.

The word 'companies' is used in a broad sense to cover the individuals, partnerships, and incorporated bodies that fall within the scope of this work. When the parent company and the shop bore different names, the one ordinarily used in advertisements and directories has been featured and the other included in the text, and all of the secondary names are included in the index. Occasionally both names were equally prominent - Clarke, Reeves and Company and Phoenixville Bridge Works; A. and P. Roberts Company and Pencoyd Iron Works. In such cases each name has its own directory entry. The index lists all the proprietors and other names mentioned in the directory and those in Appendix D, but, in general, it does not cover the other appendices. Companies that built only for themselves, such as the Pennsylvania, New York Central, and other railroads, are not included. Agents for fabricating companies also are excluded, as are those companies that owned or promoted individual structures (the names of some are misleading). The books by Richard Allen and George Danko include many names that were not listed in national directories. As these men seem to have been on the fringe of the industry, building bridges being only one of several occupations, their names have been omitted; to have included them would give a false impression of the activity in some states.

The dates given for each entry are those of known activity or directory listing. These dates must be taken as only approximations of when the company existed, for the time between gathering data and its publication was at least half a year, and in that period a company could change its name or close. Some firms were listed for several years after they had stopped operating. Definite information is given in the text portion of the entries, and only the positive statements should be considered as describing the company's period. The year 1901 in the date column signifies only that the company was active or was listed in that year. As this study does not extend into the twentieth century, 1901 should not be taken as a terminal date.

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This is a preliminary study and a considerable amount of work remains to be done. The author is, of course, responsible for errors of fact and interpretation, and he will be grateful for additions and corrections so that a more complete list of the nineteenth-century bridge builders can be made.

