Norcross, Fuller, and the Rise of the General Contractor in the United States in the Nineteenth Century

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Writing in 1917 about the changes in architectural practice since the beginning of his career in 1874, Boston architect Robert D. Andrews noted, "apart from the physical inventions which have added so much to the ease and convenience of modern life, the emergence of the general contractor constitutes the most significant change in professional practice" (1917, pp. 237-8). Given the tremendous amount of change in technology at the end of the nineteenth and opening of the twentieth centuries, it may be surprising that an architect would single out the growth of general contracting as a watershed event. But the emergence of the general contractor, part of the specialization in the building industry that flowered at this time, indeed fundamentally transformed the role of the architect in building production.

Before the 1870s, buildings usually involved many contracts, one for each trade, and architects oversaw and coordinated the various tradesmen. Andrews wrote that in the bad old days, a "city house" might require ten to twenty different contracts. He recalled, "The architect had to correlate the working of all those trades and it required much tact and firmness to settle the incessant questions of responsibility arising under these conditions" (1917, p. 238).

General contracting begins in the United States in the 1870s, when builders first took single, or whole, contracts to erect all, or at least the bulk, of large and complicated buildings. While single contracts were known earlier than this, these would have been for small projects, such as houses and small churches. An exception was contracts for public buildings awarded by the U.S. Treasury Department, but this was an unusual case, and the department's venture into whole contracts in the antebellum period did not jumpstart the general contracting business in the United States.

LARGE CONTRACTORS IN GREAT BRITAIN: THOMAS CUBITT

In contrast, in Great Britain, general contracting was established by the beginning of the nineteenth century, indicating that specialization in the building industry began at an earlier date than in the US. Before the nineteenth century in Britain, each trade did its own work on a building, and architects made a contract with each one separately. This began to change at the opening of the nineteenth century when some builders, architects, or surveyors took contracts to erect entire buildings. Eventually whole contracts became the norm for large buildings. Two sorts of contractors emerged. The more usual type was a tradesman, such as a carpenter, who did the work of his trade himself with his own workmen and subcontracted for the work of other trades. Another type of

contractor handled all the work with his own workforce and therefore employed a variety of tradesmen. There were two methods for paying contractors. One was by unit price: the contract would specify a price for each unit of labour and materials, and payment was made according to the number of units supplied. Another way was the "contract in gross," or as it is commonly known in the United States, lump sum contract, which involved one overall price for a project (Hobhouse 1971, pp. 7-12).

These developments can be seen in the career of the great Victorian builder Thomas Cubitt (1788-1855). Cubitt trained as a carpenter, and around 1812 he began working as a general builder. He handled the work of his own trade and subcontracted with tradesmen in other fields. But as he could not control the quality or timeliness of his subcontractors' work, he began to employ tradesmen directly and dispense with subcontractors. The first large project he undertook using his own employees was a new mansion for the London Institution in Finsbury Circus. His brother William also became a contractor, and both eventually employed all the workers they used. According to William's 1828 testimony before a parliamentary committee, Thomas employed 1 000 workers while William, of William Cubitt & Co., employed 700 men.

Thomas Cubitt ventured into lines of business besides building contracting. He became a manufacturer of materials, fabricating most of the building materials he used at his shops in St. George's Square. He also invested in real estate, which produced both income and work: he developed land (installed streets, sewers) and erected blocks of residences on speculation around London. Cubitt could provide a range of services in addition to building; his company included departments for architectural design and engineering, and he made loans.

The Cubitt brothers' firms were only two among several large contracting firms in England in the first half of the nineteenth century. Thomas Cubitt was not the first builder to take whole contracts, employ his own workforce, and make his own construction materials. Nevertheless, the scale of his works set him apart from the others, and his biographer, Hermione Hobhouse, considered him a trendsetter – someone who developed and streamlined the large building firm. While she cautions that big contractors "were not as representative or dominating as contemporary building journals lead one to suppose," nevertheless such firms probably were the ones that erected the large and important buildings of the time (Hobhouse 1971, p. 10).

BEGINNING OF GENERAL CONTRACTING IN THE USA

A way to trace the emergence of general contracting is to see when the term came into use. The word "contractor" was used in Great Britain in the early eighteenth century, at which time it applied to men who built public works, such as lighthouses or bridges. Perhaps the term originated because the individuals who managed engineering projects were not associated with any traditional trade. Moreover, since such works were often commissioned by government or public agencies, "contractors" were often people who contracted with the government. In the US, the term likewise

was first used to describe businesses engaged in engineering and public works and later was applied to builders who took whole contracts.

The pioneer general contractors for buildings came into being in the 1870s. Although they comprised only a small minority of builders by the late 1880s, nevertheless they had become important players in the building field – undertaking the more complex building projects. By that time, the idea of taking whole contracts was well established, according to the New York architect Oliver P. Hatfield. In an 1889 paper he read to a convention of the National Association of Builders (established 1887), Hatfield called masons and carpenters "principal contractors" and said that "in most sections of our country the whole contract is taken by these [tradesmen], all other building tradesmen coming in as subcontractors, engaging to furnish their work directly to the principal contractors" (1889, pp. 16-7).

General contracting came about because of increased specialization and complexity of construction projects. A 1906 report by a committee of architects studying the relation of their profession to the "contracting system" identified these as the reasons general contracts began to be used. The committee wrote that at the end of the 1880s,

> As building construction became more complex there arose a desire to place the work of these various trades under one general contract…. It was found in practice, that at times, with a number of minor contractors at work on one building there were moments of friction, interference, and delay…. Therefore it seemed desirable to put all the work under one general contractor, who would be solely responsible for the whole building and for items which might have been overlooked in minor subdivision.
>
> (AIA 1906, p. 89)

But while growing complexity in building was a necessary precondition, it was not a sufficient reason for the appearance of general contractors. First builders had to solve the problem of getting enough capital to cover the costs of enlarged operations (the time span between meeting payroll and paying suppliers, and being paid by the owner), and the larger the project, the more money they needed. One solution was to own real estate, which could be used as collateral to obtain a business loan. Another was to have affluent family members willing to make loans. Yet another was to get owners to make frequent payments on contracts, which reduced the time span. Builders also obtained materials on long credit. Finally, the contractor could function as a construction manager rather than an employer, an approach George A. Fuller helped develop, which reduced his cash requirements.

Two firms that significantly influenced the development of general contracting in the United States were the Norcross Brothers and the George A. Fuller Company. Norcross Brothers, Contractors and Builders, was one of the first general contractors for buildings in the United States, perhaps the first that worked nationwide, and also, at the turn of the twentieth century, the largest. The George A.

Fuller Company represented the second generation of general contractors; this firm became one of the most prominent builders of skyscrapers. Its contribution to the development of general contracting included its innovative building methods; emphasis on speed, which became a hallmark of American building methods; and promotion of cost-plus, in contrast to lump sum, contracts.

NORCROSS BROTHERS COMPANY

During its roughly sixty-year existence (1864-1924), Norcross Brothers Company built 338 known buildings (apart from monuments and other kinds of structures), a group that included some of the most important and admired buildings in their day (Girr 1996, appendix A). Since they were one of the first to take whole contracts, it would be interesting to know why the two brothers, trained as carpenters, decided to do so and how they got the resources to handle their first large commissions. Unfortunately, business records for the firm have not survived.

James A. (1831-1903) and Orlando W. (1839-1920) Norcross, the brothers who founded the firm, were sons of a carpenter and millwright. Around 1864, they went into business together as builders and a few years later won an important commission: to build a large church in Leicester (1866-7), a town in Worcester County, Massachusetts. Not long after this they moved to the city of Worcester where they established their headquarters. James managed the office while Orlando (O. W.) was the outside man in the business – always travelling, figuring, and visiting job sites. According to a contemporary and colleague, O.W. was a "genius in the building profession" (Schweinfurth 1931, p. 92).

The brothers showed a venturesome spirit early in their partnership. They took whole contracts for large, masonry buildings, although their training was in carpentry and their financial resources were modest. Probably the first of these projects was Crompton's Block in Worcester (1868), a five-storey brick commercial building. With this building, they briefly got in over their heads. A reporter with R. G. Dun & Co., the credit rating agency, wrote that the brothers were "worth nothing then and soon embarrassed;" but with the help of friends "they completed a very good and profitable job" (Dun Coll. Mass. v. 99, p. 20). In 1869, they won the contract to build a high school for Worcester – another large, brick building that featured a tower entrance (completed 1871). In addition to raising the firm's profile, this project introduced the brothers to its architect, Henry H. Richardson, who would become the foremost American architect of his generation (Ochsner 1982, pp. 68-9).

Although Norcross Brothers started with "nothing," the firm apparently operated profitably and used its profits to finance work on new projects. An 1870 Dun & Co. report described the brothers as "energetic enterprising men making money," and while their capital was small, they were trustworthy and already a "large business." The following year, a Dun & Co. reporter noted the firm had "heavy jobs," but were doing "very good work" at a profit. The brothers also must have priced

their work aggressively. One Dun & Co. reporter commented, "some think they underprice but somehow they seem to get out all right" (Dun Coll. Mass. v. 104, p. 822).

A key to the firm's ability to be competitive yet profitable was O. W.'s extraordinary talent as a cost estimator. A Dun & Co. reporter wrote in 1874, "Orlando…has but few superiors in figuring on contracts, closely and with safety" (Dun Coll. Mass. v. 99, p. 20). An architect who had worked with Norcross agreed. He recalled that in his early days, O. W. pored over drawings, specifications, contracts, and correspondence in order to work up a bid. When the firm was large and well established, it employed a corps of assistant estimators to develop figures; yet O. W. could glance at drawings and state a round sum that "in eight cases out of ten … would be fairly close to the figure arrived at by the more laborious process" (Schweinfurth 1931, p. 94).

Stone construction became the firm's specialty. Around 1872, Norcross Brothers had contracts for two stone buildings designed by Richardson as well as the stone Park Congregational Church in Norwich, Connecticut (1873), designed by a Worcester-based architect and Richardson disciple, Stephen C. Earle. The next year, 1873, the brothers signed a contract for their largest commission to date: Richardson's Trinity Church in Boston (1873-76). This enormous church was to be built with brown sandstone in the Romanesque style.

Two important features of the company were in place by the 1870s. The first was that the firm hired tradesmen and worked with its own employees rather than subcontracting. The second was that it supplied much of the material it used in its projects and for this purpose, operated quarries and workshops. By the early twentieth century, when the subcontracting system was commonplace in many cities, the Norcross Brothers seemed unusual because the firm continued to employ rather than subcontract with tradesmen. But since the firm started up before specialized subcontractors existed, their original business model was unavoidable. Thus, Norcross Brothers employed mechanics in all the necessary crafts and appointed a foreman to oversee each department. In fact, the brothers seem to have operated much like Thomas Cubitt.

And like Thomas Cubitt, Norcross Brothers supplied its own materials. Around 1873, in order to carry out the Trinity Church contract, the brothers leased a quarry for ten years to supply the stone for the building (Dun Coll. Mass. v. 104, p. 822). In 1881, the firm built a workshop and offices on East Worcester Street in Worcester, near the Union Railroad Yard. The plant had shops for cabinetmaking, painting, blacksmithing, and machining as well as space for storing lumber. At the turn of the twentieth century, the firm or Orlando Norcross individually had interests in at least nine stone (granite, sandstone, marble) companies in several states. O.W. was president of Blandford Brick & Tile Co., with works in Russell, Massachusetts. Presumably the rationale for owning the quarries and shops was to allow Norcross Bothers to get materials to its job sites when needed and thereby minimize costly delays. Having supplies on site when required was one of the most critical

factors in being able to complete a building on time. Norcross Brothers were not unusual in owning sources of supplies; many New England building companies did likewise (Architectural Record 1977, p. 109).

Rise of Norcross Brothers

The Trinity Church project was a turning point for the firm. The job was full of risks; among these was the fact that the architect designed the building while it was going up, yet the firm had a lump sum contract. But Norcross Brothers got favourable terms in their contract: they agreed to build the church and furnish nearly all the materials (on a contract worth $435 000) while "giving no bond" and were to be paid monthly in cash, with only about 10% of the contract amount retained until completion (Dun Coll. Mass. v. 99, p. 20). The firm publicized their new status as "contractors." Formerly called "carpenters and builders," the firm described itself in an 1872 advertisement as "Norcross Brothers, Contractors and Builders" (Girr 1996).

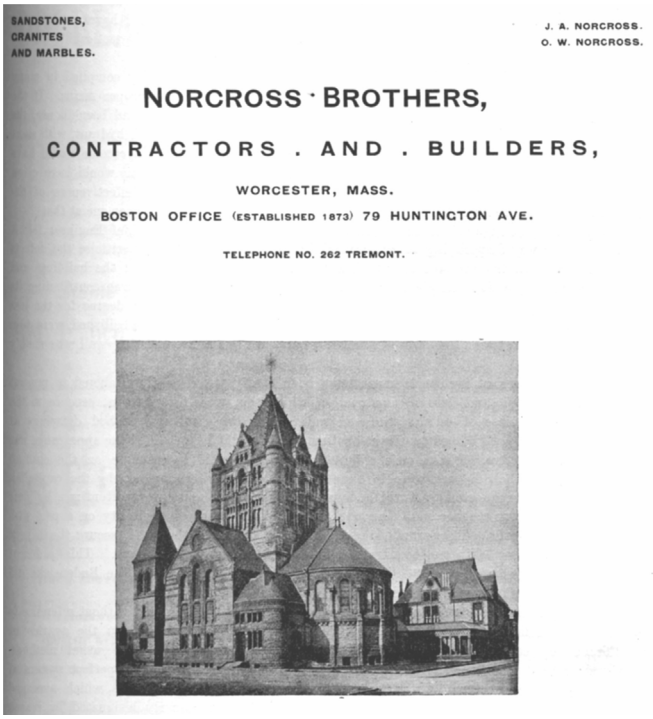

Fig. 1. Norcross Brothers advertisement, showing Trinity Church, Boston, 1895.
(Charles Damrell, *A Half Century of Boston's Building,* Boston: Louis P. Hager, 1895).

The brothers were fortunate to have the Trinity Church contract when they did as it helped them weather the depression that followed the Panic of 1873. Yet even in the lean years of 1874-6, the firm had several projects underway. They built two churches, three libraries, and two commercial

buildings. Four of these were designed by Richardson and all were stone. By this time, the brothers had accumulated a respectable amount of working capital as well as some prominent financial backers. A Dun & Co. reporter in 1876 noted the firm had $10-15 000 cash on hand at all times. The president of the First National Bank of Worcester pledged to help the firm fulfill the Trinity Church contract from the bank's and his own personal resources (Dun Coll. Mass. v. 99, p. 20). The brothers were comfortable enough to build handsome stone houses for themselves, side by side, at 16 and 18 Claremont Street in Worcester (1878). They emerged from the depression years comparatively wealthy and, with their growing experience, poised to expand operations.

An unusual move by the firm was to take contracts for jobs far from Worcester. The way they got business in distant cities was by bidding on projects designed by architects they knew. Thus, Norcross Brothers built Earle's library in Rhode Island and church in Connecticut, and Richardson's commercial building in Connecticut. In 1873, while building Trinity Church, the firm opened a Boston office. At the end of the 1870s, Norcross Brothers broke into the New York City market, when it won a contract to build the Union League Club House there, designed by the Boston-based architectural firm of Peabody & Stearns. In the early twentieth century, Norcross Brothers Company had offices in Boston, Chicago, New York, and Washington, and in Montreal and Toronto, Canada, in addition to Worcester.

Unlike most nineteenth century firms, the Norcross Brothers grew steadily. In 1886, the firm reportedly had over 1 000 men on its payroll. It owned land in Worcester; Providence; Milford (Massachusetts); and elsewhere. At that time, it was working on a massive building in Pittsburgh, Pennsylvania: Richardson's Allegheny County Buildings (1883-8), worth $2.27 million. The following year, the firm was busy in Chicago erecting Richardson's celebrated Marshall Field Wholesale Store (1885-7). The next year, the firm built railroad stations in Springfield, Massachusetts and Hartford, Connecticut. A Dun & Co. reporter estimated the brothers' worth at that point "conservatively" to be from one to four million dollars. The firm also worked on structures other than buildings, such as bridges and seawalls, and it was the contractor for clearing ledge from the channel at the Portsmouth Navy Yard in Maine.

O.W.'s work with architects

Beginning with the high school project, the Norcross Brothers firm maintained a long association with Henry H. Richardson, becoming, as historian James O'Gorman writes, Richardson's master-builder. From this point until the architect's death in 1886, they built the majority of Richardson's buildings and nearly all of his major buildings, at a time when the architect's prestige was at its peak. More than being skillful builders, O'Gorman concludes, the brothers could "only be described as Richardson's collaborators" (1973, p. 108). O'Gorman argues that with their experience working in stone and because they owned quarries, Norcross Brothers influenced the direction of Richardson's architecture, helping to make stone a characteristic feature of the architect's mature style.

From the 1880s to the beginning of the twentieth century, Norcross Brothers built some of the most prominent buildings in the United States, designed by architectural firms that were among the nation's artistic leaders. Like Richardson, these art-architects left construction details and technical aspects of their projects to Orlando Norcross (Girr 1996, p. 17). Thus, the contractor enabled architects who had little interest in construction to create buildings that were challenging from a construction standpoint: e.g., massive, heavy, tall. The firm specialized in institutional and government buildings, not commercial structures. O.W. built some skeleton frame buildings, such as the 500+ ft, steel-frame Boston Custom House tower in Boston (1911-15), the city's tallest building. But he was not interested in building skyscrapers, commenting "In a country where land is as plentiful and as low in cost as in the United States, there is no valid excuse for its existence" ("Memoir" 1921, p. 897).

Denouement

After James's retirement in 1897, O. W. carried on the business by himself for a time and then in January 1902, incorporated the firm under the name The Norcross Brothers Company. The following year, the firm reportedly had $9 million in work underway and employed thousands of men ("Failure" 1903, p. 6). In the early twentieth century, Norcross Brothers expanded into Canada. Some of their Canadian projects were designed by American architectural firms, e.g., McKim, Mead & White (Bank of Montreal, Montreal, Quebec [1901-4] and Bank of Montreal, Winnipeg, Manitoba [1910-12]) and Carrère & Hastings (Bank of Toronto, Toronto, Ontario, 1910-2). In the US, Norcross Brothers continued to focus on buildings for institutional clients: schools, hospitals, libraries, clubhouses, and religious buildings, as well as government buildings.

Norcross Brothers may have found it easier to win commissions in Canada than in the US in the early twentieth century, when new national contracting firms, such as the George A. Fuller Co. and Thompson-Starrett Co., a Fuller spin-off, had become aggressive competitors. Norcross Brothers supplied stone for projects for which it was not the general contractor, for example, New York's Pennsylvania Station and the Field Museum in Chicago. On the latter project, the firm lost $500 000. In the 1910s, O.W. spent much time defending his patents for flat slab concrete floor construction. Indeed, Norcross's patents preceded those of C. A. P. Turner (Prideaux-Brune 1988). In 1920, at age 80, O.W. was still working when, riding on a streetcar, he suffered a heart attack and died. The company dissolved in 1924.

GEORGE A. FULLER COMPANY

Worcester, Massachusetts spawned another important builder, George A. Fuller (1851-1900). Unfortunately, no records of this company are publicly available, so its history too must be reconstructed from disparate published sources.

Fuller trained as an architect, at first in the office of his architect uncle James E. Fuller in Worcester. If he started sometime between 1869 and 1871, he could have learned about the

Norcross firm from a project in his uncle's office: the new Worcester High School. James's partner at the time, Stephen C. Earle, served as the superintending architect for this project.

Fuller was exposed again to Norcross Brothers through his next employer, the Boston architectural firm of Peabody & Stearns. He joined this large firm in 1874 and remained until about 1881, becoming its chief designer and an important member of the office staff. During this period, Norcross Brothers built several of Peabody & Stearns's projects, including Harvard University's Hemenway Gymnasium (1878-81) and the Union League Club House in New York City (1879-80).

At Peabody & Stearns, Fuller gained experience working on tall, iron-framed, fireproof buildings. When he joined the firm, one of its projects was the New York Mutual Life Insurance Co. in Boston (1873-5). This six-storey building was one of Boston's first fireproof buildings: it had an interior frame of iron and brick arches spanning between beams to form the floors and roof. Fuller managed the construction of a structurally similar fireproof building: the nine-storey United Bank Building (1880-1, also called the First National Bank Building) in New York City.

In connection with this project, Fuller opened a branch office for Peabody & Stearns in New York City. The office lasted only a couple years, through 1881. Two draughtsmen who worked with Fuller in New York during this time wrote recollections that give some insight into the course his career took. One of the draughtsmen, Julius A. Schweinfurth, remembered Fuller as a talented and tireless worker: "As a draughtsman, he was among the best of his time, more inclined to construction than to design, and his standing in the office, his opinions and policies were unquestioned by 'the firm'"(1931, p. 49). Another draughtsman, Clarence H. Blackall, recalled that as work slowed in the New York branch in 1881, Fuller "began to take flyers on the stock market, and got in so bad that if Stearns hadn't come to his rescue he would have been wiped out" (1994, p. 189). Thus, we have a strong leader who was knowledgeable about design and willing to take risks.

Around this time Fuller moved to Chicago and began working as a contractor. The exact reason for his relocation is uncertain. Likewise, why he left architecture and entered a new line is unknown. Schweinfurth noted Fuller's early inclination towards construction and that Fuller dabbled in real estate development, having built a small apartment house (1931, p. 49). Perhaps like a later president of the Fuller Co., Paul Starrett, he concluded he was not cut out to be a designer but had an instinct for construction, and he expected building would prove more lucrative (Starrett 1938, pp. 33-4).

It was probable, too, that Chicago at this time offered more opportunities for builders than for architects. The city in 1880 was on the verge of a boom in commercial construction; it was recovering from the economic depression and absorbing the large stock of buildings thrown up after the 1872 conflagration. It was also a centre of innovation in building materials and construction technology, notably fireproof construction (Wermiel 2000). With his experience working on

fireproof buildings, Fuller was in a good position to set himself up as a contractor to meet the growing demand for fireproof structures.

In 1882, Fuller established the George A. Fuller Co. with a capital of $50 000 (Daly 1958, p. 9). One of his first large projects was the Chicago Opera House Block (Cobb & Frost, 1884-5). It was here, according to the Chicago builder and building official Henry Ericsson, that the "general contractor" was born. What Ericsson must have meant was that the cost-plus type of contract was born, which is implied by his calling this development a "factor that entered the industry at this pivotal stage to pad the costs of building" (Ericsson 1942, p. 220). Fuller's Opera House contract likely was cost-plus, but the one he took soon after, for the Rookery Building in Chicago (1886-8), definitely was. Blackall wrote that this building's architects, the up-and-coming partnership of Burnham & Root, favoured Fuller's company and gave it the contract on a cost-plus basis, from which Fuller gained "experience, reputation, and money" (1994, p. 190).

Cost-plus contracts

The cost-plus contract differed from the usual sort of general contract, which was the lump sum contract. In the latter type, the contractor agreed to erect a building for a set price. With a cost-plus type, the general contractor was paid a fee to engage subcontractors and manage the work, while the owner paid the actual construction costs (labour and materials). Typically the fee was figured as a percentage of the construction costs, although it could be a flat fee. A cost-plus contract might or might not specify a maximum construction cost, which today is called a guaranteed maximum price.

While the cost-plus contract seems sophisticated and therefore a modern invention, actually something like it was used in New York City in the 1860s, in connection with day's work construction. Under day's work, an owner paid for labour and materials, and hired superintendents to oversee the workmen; the superintendents functioned like contractors with cost-plus contracts.

Fuller therefore did not invent cost-plus contracting; nevertheless, the system was uncommon when he began to sell the idea to owners. He undoubtedly helped make the cost-plus system acceptable to owners. It seems likely that it was his background in architecture that inclined Fuller to think of himself as a professional and to charge a fee for service based on construction costs, which was how architects usually figured their fees at the time. Fuller apparently was able to convince owners and architects that he, a contractor, was a professional, not a mere mechanic. Necessity may also have led to its invention. Cost-plus contracts entailed less risk for the contractor than lump sum contracts, especially when they did not contain a guaranteed maximum. As importantly, by subcontracting most of the work and having the owner pay subcontractors directly, the general contractor needed less working capital. Through the first half of the twentieth century, the Fuller Co. did mainly (although not exclusively) cost-plus work.

The cost-plus contract could only have won acceptance by offering advantages for owners and architects. For the owner, the principal one was that construction could begin before all architectural

drawings and specifications were complete – which would otherwise be necessary for soliciting bids – and thus design and construction could proceed simultaneously (today called fast track). Some architects preferred the cost-plus contract because it allowed them to work more collaboratively with a builder than under a lump sum arrangement. However, since the contractor's fee rose along with construction costs, cost-plus contracts that were loosely drawn or lacked a guaranteed maximum encouraged builders to overspend – the padding Ericsson disparaged.

Fuller's expansion

Like Norcross, Fuller became a collaborator with architects in the design process and helped develop new solutions to construction problems. Fuller was the first builder to have a tar-paper roof put over a building site so that foundation work could go forward in bad weather. He did this on the Rookery Building and this project, Paul Starrett believed, helped establish both the architects and Fuller as "the leading men in the building business" (1938, p. 22). The Tacoma Building in Chicago, built by Fuller (1888-9), is a landmark in the evolution of skeleton frame construction, being the first structure with curtain walls (the frame supporting loads with the "walls" merely enclosing the building) on its two street façades. Raymond Daly, president of the Fuller Company in the late 1950s, explained that when skyscraper construction was being developed, "Chicagoans brought their building problems to Mr. Fuller and those problems were solved time and again. As a builder with architectural training, working closely with architects, he was so trusted on all sides that for many years after the Tacoma Building not a single important building went up in that city [Chicago] that did not bear the imprint of George A. Fuller Company" (1957, p. 11). While Daly exaggerates Fuller's dominance a bit, certainly his firm built many of Chicago's pioneer skyscrapers.

Like Norcross, Fuller was able to build outside Chicago by bidding on buildings designed by architects he knew. One of his first buildings outside Chicago was the eight-storey Equitable Building in Atlanta (1890-2), designed by Burnham & Root and considered Atlanta's earliest skyscraper. Another was the D. S. Morgan Building in Buffalo, New York (1895), designed by Holabird & Roche. In 1898-9, Fuller built the Massachusetts Building, later the Union Trust Building, in Baltimore, which was designed by the Boston architectural firm of Winslow & Wetherell.

Fuller used his connections with architects and investors to expand his operations to the East Coast in the late 1890s and to break into the New York City building market – the center of skyscraper construction. In 1896, Fuller opened an office in New York City, managed by Harry S. Black, his son-in-law, and Theodore Starrett. They worked with some Midwestern and Boston men on a project for a building at Broadway and Chambers Street (Broadway-Chambers Building), which took several years to come together. In the meantime, Fuller got his first New York commission: the Coe Estate Building, a narrow, 10-storey building at 636-8 Broadway, designed by George B. Post (1896-7) (Architectural Record 1977, p. 109). Next he built the 1898 Chesebrough Building in

lower Manhattan ("New" 1898). Also in 1898, Fuller joined a syndicate that purchased a lot at Church and Leonard streets, in order to build a 12-storey structure ("A Big" 1898). During this period he built the Brazer Building in Boston (1896-97), which was developed by some of the men working on the Broadway-Chambers project, including Cass Gilbert, an architect working in Minnesota. The Brazer Building was Gilbert's first East Coast commission (Irish 1999, pp. 50-7).

The Broadway-Chambers Building project came to fruition in 1899 (completed 1900). At 18 stories with a small (about 51 x 94 ft) footprint and a skeleton frame, this building qualified as a true skyscraper. Fuller's firm put up $100 000 of the $500 000 cost, and he helped arrange a loan for the principal investor. What this suggests is that at first, apart from the Chesebrough Building, Fuller got work in New York City by developing projects with out-of-town architects and investors, rather than by competing with local builders. But as a specialist in erecting skyscrapers, he soon became established. In 1900, the Fuller Co. had the contract to build the Broad-Exchange Building in New York: at 20 stories and 326 500 rental sq. ft, the largest office building in the USA (Landau and Condit 1996, p. 301).

Fuller remained in Chicago and did not live to see these New York projects completed. He died in December 1900, at the young age of 49 – "burned himself out with hard work" according to Paul Starrett, a long-time employee and executive with the company (1938, p. 70). Harry Black then moved the firm's headquarters from Chicago to New York, where it remained until it closed nearly one hundred years later.

In the twentieth century, the George A. Fuller Co. continued to be one of the nation's largest builders and put up many prominent structures, including such landmarks as the Fuller (a.k.a. Flatiron) Building (1900-3); Lincoln Memorial (1914-22); Philadelphia Savings Fund Society Building (1929-32); the United Nations Secretariat Building (1949-50); Lever House (1952); and Seagram Building (1957). After 1970, the company changed hands many times and declined. It closed finally in 1994 ("Big" 1994, p. 1).

Fuller's influence

Other builders followed Fuller's lead and became cost-plus contractors. One of the most important was Theodore Starrett, founder of Thompson-Starrett Company. Around 1890 or 1891, Starrett left his job as a draughtsman and site superintendent with Burnham & Root and started working with Fuller. The Starrett-Fuller partnership lasted briefly, then Starrett started contracting firms with other partners. He returned to the Fuller Co. as a vice president and opened the branch office in New York, where he helped establish the company as an important player in that city. But around 1899, he left this position to found a contracting firm with Henry S. Thompson. Thompson-Starrett Company, like the Fuller Co. after 1900, was headquartered in New York City, where most of the nation's skyscrapers were being built, and his firm competed with Fuller's for steel-frame construction and commercial projects. Through the 1930s, Thompson-Starrett Co. only accepted

cost-plus work (Horowitz 1937). Another spin-off of the Fuller and Thompson-Starrett companies was the Starrett Brothers, later Starrett Brothers & Eken, founded in 1923 by a former president of the Fuller Co., Paul Starrett, along with his brothers William and Ralph, who had worked with their brother Theodore at Thompson-Starrett. When Thompson-Starrett declined around mid-century, Starrett Brothers & Eken rose and became one of the leading construction firms in the nation. It too did only cost-plus work. But cost-plus contracts were not confined to the largest builders or those with some Fuller connection. By the early twentieth century, cost-plus contracts had become common – so common that some architects viewed these professional builders as trespassers on architects' territory, who might overthrow the architect as the leader in a construction project (AIA 1906).

Fig. 2. Fuller (Flatiron) Building, New York City, c. 1910 (Irving Underhill, photographer, Library of Congress, Prints and Photographs Division).

Speed

The great selling point of the cost-plus contract was speed: the ability to begin construction before all drawings were complete. Of course, one could name other reasons for entering into cost-plus contract, such as the greater potential for teamwork among the parties involved in a building

project. But when Fuller persuaded owners to hire him, it was because he promised fast work. This won him commissions; but he became a victim of his success. Speed became an obsession at the turn of the century.

Skeleton frame construction made it practical to build structures very tall, but it also made it possible to build very quickly, because once the frame was erected, work could proceed on any level. Contractors seemed to compete with each other to set records, egged on by the press. Cass Gilbert, architect of Fuller's first New York skyscraper (Broadway-Chambers), tried to correct the impression that rapid construction was merely for bragging rights. In his article "The Financial Importance of Rapid Building," he argued that speed was necessary because time was money: the sooner a building could be completed, the sooner the owner would be collecting rent. (Gilbert 1900). Thus the mere three months it took to erect the steel frame of the Broadway-Chambers Building was simply good business. This sort of article was publicity for Gilbert, the Fuller Co., and for the idea of speed. Only companies with intimate knowledge of the requirements of this sort of work, he wrote, could achieve these results. But he did remark that such work put a strain on all involved. Indeed, it apparently drove George Fuller to an early grave. Nevertheless, American construction became more efficient as a result.

It is interesting that the Fuller Company did not consider Norcross – in 1900 the nation's largest builder – a competitor, perhaps because Norcross did not bid for skyscraper projects. At the turn of the century, Norcross Brothers was doing millions of dollars worth of work in New York City, e.g., building the New York Public Library and Columbia University's new campus. The two firms worked together on at least one building: Pennsylvania Station in New York (Fuller built it, Norcross supplied the stone). Yet in recounting the construction of Penn Station, Paul Starrett refers to Norcross simply as "the New England granite man" (Starrett 1938, p. 142).

CONCLUSION

Around 1900, the Norcross Brothers and Fuller companies were probably the largest general contractors in the US and both were renowned for the quality of their work. Norcross Brothers pioneered the business of general building contracting when it took whole contracts – lump sum – for large buildings and grew in capacity so that it was able to undertake projects across the US and in Canada. Its specialty was massive, masonry, bearing-wall buildings. The Fuller Co. began as a general contractor and developed a different business model, now called construction management, using the cost-plus contract. Fuller specialized in building tall commercial buildings, which owners wanted put up rapidly so they could begin producing income as soon as possible. Owners accepted the cost-plus system because it allowed the contractor to begin working on a building before all drawings and specifications had been completed. Fuller subcontracted for most of the labor and materials used on his projects, unlike the Norcross Brothers firm, which worked with its own employees and produced its own materials. Both types of general contracting firms could be found

at the turn of the century, with Norcross at one end of the spectrum, Fuller at the other, and others falling in the range between them.

The emergence of the general contractor was a manifestation of the trend toward specialization in the US building industry. When superintending a myriad of tradesmen on large projects became too much for architects, builders created the role of the general contractor, which relieved architects of many job-site responsibilities. But this tidy three-party situation, involving the owner, architect, and general contractor, has come undone as new, even more complex projects appear, along with new sorts of building specialists. Rather than the teams of tradesmen of the past, complex projects today involve teams of specialized professionals and tradesmen. Both lump sum and cost-plus contracts are used today. But owners may opt for cost-plus contracts, not for the sake of speed, but to allow the general contractor/construction manager to collaborate with the designers and others as the project is being developed.

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