

## **“Buildings without Walls”: Curtain Wall Development in Chicago Architecture of the 1890s**

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“...we have no hesitation in stating that the Home Insurance Building was the first high building to utilize as the basic principle of its design the method known as skeleton construction, and that there is convincing evidence that Major Jenney, in solving the particular problems of light and loads appearing in this building, discovered the true application of skeleton construction to the building of high structures and invented and here utilized for the first time its special forms.

“We are also of the opinion that owing to its priority and its immediate success and renown the Home Insurance Building was in fact the primal influence in the acceptance of skeleton construction; and hence is the true father of the skyscraper.”

Report of the Committee Appointed by the Trustees of the Estate of Marshall Field for the Examination of the Structure of the Home Insurance Building, Thomas E. Tallmadge, Chair.  
22 November, 1931 (Tallmadge, n.p.)

The report of a committee of nine eminent architects, historians, and attorneys on the structure of the then-recently demolished Home Insurance Building in Chicago, IL in 1931 established more than simply the alleged primacy of that building in the achievement of the Chicago skyscraper. The committee, in promoting the 1885 Home Insurance as the first modern skyscraper also established, for generations to come, the primacy of structure in determining the form and function of the tall commercial building. Structural performance is, of course, essential to the skyscraper, but its technical determinacy is balanced by an array of other systems, including environmental control, vertical transportation, fire suppression, plumbing and illumination, that play major roles, often architecturally determinant ones. In this case, the Committee appears to have ignored - perhaps strategically - the importance of the light-weight, strategically transparent skin in its hagiography of the Home Insurance and its engineer-architect, William Le Baron Jenney. (Tallmadge’s committee was not the only one charged with “discovering” the primeval skyscraper during the 1930s, nor were its conclusions universally accepted). A committee of three prominent Chicago engineers published a report in 1932 that expressly rejected the Home Insurance Building’s claim, noting that it “was principally lacking in not having curtain walls, no provision in the framing for wind loads, and not having made full provision for starting the masonry above the first floor.” This committee expressly declined to name one building as the “first skyscraper,” noting instead that while the Home Insurance had “made a marked advancement,” the Tacoma Building (see below) “went a step

farther.” See J.C. Sanderson, J.L. McConnell, and F.J. Thielbar, “The Home Insurance Building: A Report on the Types of Construction Observed as [it] was Demolished.” *Journal of the Western Society of Engineers*, Vol. XXXVII, no. 1. February, 1932, 7-9. Despite this and other objections to the claims of the Tallmadge Report, its description of the Home Insurance as the “father of the skyscraper” or the “primal influence” on skeleton construction was largely accepted by historians, including William H. Jordy (“In a technological sense, therefore, the Home Insurance is generally acknowledged as the first skyscraper”), Ada Louise Huxtable, and even Carl Condit (“The Home Insurance Building represented the decisive step in the evolution of iron and steel framing.”) See William H. Jordy, “Masonry Block and Metal Skeleton: Chicago and the ‘Commercial Style’ in *American Buildings and Their Architects: Volume 4, Progressive and Academic Ideas at the Turn of the Twentieth Century*. (rep., New York: Oxford University Press, 1986) 20-21, and Carl Condit, *The Chicago School of Architecture*. (Chicago: University of Chicago Press, 1964) 81.)

Tallmadge’s committee considered two possible challengers to the Home Insurance as the first “skeleton building”: unbuilt but patented schemes by Minneapolis architect Leroy Buffington, and the Tacoma Building (built in 1889 and demolished in 1929) designed by Chicago architects Holabird and Roche, which had stood a block away from the Home Insurance building at the corner of La Salle Street and Madison Avenue. Buffington’s patents were rejected by Tallmadge for the understandable reason that they had been unbuilt, but the Tacoma was dismissed for what seems a technicality. While the majority of its structure was cast and wrought iron beams, girders and columns, the Committee noted that, upon its destruction, the Tacoma’s structure revealed substantial load-bearing masonry elements in its party, alley, and courtyard walls. In their estimation, only a quarter of the building had been carried on a “skeletal” frame, and thus it was eliminated from contention.

Tallmadge’s report was a defining moment in the creation of an architectural mythology in Chicago that privileged the frame structure as a defining technical characteristic of the tall building. By claiming Jenney’s building as the ‘first true skyscraper’, the commission had by necessity to claim that the frame was the defining characteristic of the skyscraper. Had they been concerned, as well, with other technical aspects of tall building construction - elevators, fireproofing, plumbing, or the development of a lightweight building envelope - the Home Insurance would have failed on any count. Elevator buildings had been constructed since the 1870 Equitable Life Assurance Company Building in New York. Burnham and Root’s Montauk Block of 1882 was the first tall elevator building in Chicago, preceding the Home Insurance Building by a good three years. Likewise, fireproofing of iron or steel structures had been commonplace in the immediate aftermath of the 1871 fire. The vagaries of tall plumbing stacks had also been largely solved by this point.

The issue of a lightweight building envelope, however, had not been appreciably solved in New York or Chicago by 1885, and it is this element that seems to offer the strongest challenge to the Home Insurance’s claim and to suggest the Tacoma as a better possibility. Yet the curtain wall was

fundamental to Chicago skyscraper development in particular for two critical, related reasons - the provision of daylight to commercial interiors, and the carrying capacity of foundations in Chicago's soil. Home Insurance may well have had the most developed metal frame of its day, but on close inspection it was an advanced structure wrapped in a very heavy masonry skin - if its metal frame anticipated the twentieth century, its envelope firmly planted it in the nineteenth. Tallmadge argued that this was merely a visual, or compositional issue, noting that the masonry was not load bearing, but was, rather, carried on the steel and iron structure behind. Photographs taken during the demolition show large angles, bolted to the building's beams, that served as lintels carrying the brick and stone envelope outside. This interpretation was later disputed; a more sophisticated structural analysis done in 1934 demonstrated that much of the Home Insurance's masonry skin was not only self supporting, but that it had also provided much of the structure's lateral stability. Even without this later analysis, the Tallmadge commission seemed to be aware that the building's heavy skin was potentially disqualifying, as it went to great lengths to disqualify the Tacoma - built three years *after* Home Insurance - on purely structural grounds. The Tacoma's extraordinary expanses of glass seem remarkably prescient compared with the massive appearance of the earlier Home Insurance.



Figure 1. The Home Insurance Building, La Salle St. and Adams St., Chicago, IL.  
William Le Baron Jenney, 1885 (demolished 1931).

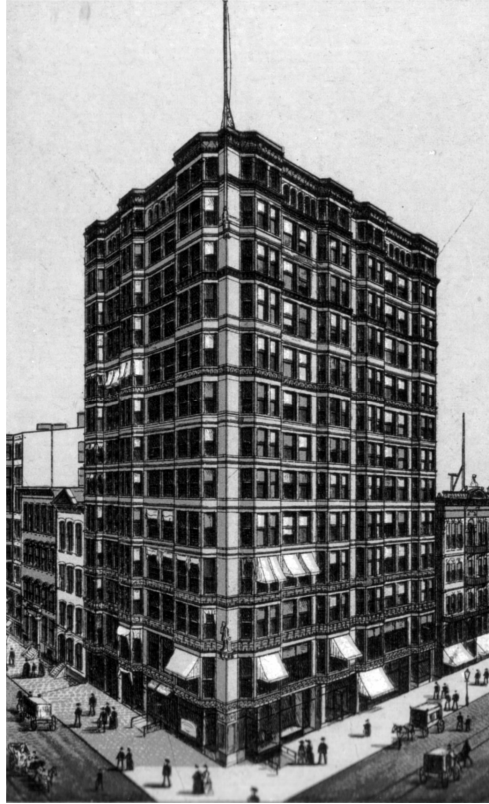


Figure 2. The Tacoma Building, La Salle St. and Madison St., Chicago, IL.  
Holabird & Roche, 1889 (demolished 1929).

Two major reasons for considering the lightweight, largely transparent skin as a definitive characteristic of the modern skyscraper, however, were laid out by John Welborn Root in his 1890 essay, “A Great Architectural Problem.” First, building interiors of the day demanded daylight, as artificial light was either expensive (for electric light, then in its technical infancy) or dangerous (gas light, which used illuminant that was both explosive and toxic). (“Decadence”, p. 60). “A Great Architectural Problem” referred almost entirely to the need to coax sunlight, by transmission, reflection, and orientation, into the depths of the extruded volumes of lettable space being developed:

The elementary question, therefore, is how to so arrange the building upon its lot that every foot within it shall be perfectly lighted, and all spaces which would be dark thrown out. To ascertain this it is necessary to know by experiment to what depth from the front wall daylight will reach, upon the average, in a story of convenient height, and giving to the space to be lighted the largest possible windows. This has been found to be in

Chicago not more than twenty-four feet, assuming the height of the story to be about eleven, and the window to be placed close to the ceiling, the average street width being assumed. This fact will, of course, dictate in general our depth of offices.

(Root, p.67)

While offering much-needed access to daylight, however, the glass window itself was a player in the simultaneous performative requirement to lighten the weight of buildings altogether. Chicago was built on the deposits of a slow river, an appalling soil for traditional foundations. Spread footings of the era were typically built of stone pyramids that literally spread the load of structural piers and columns out over a suitable area of ground. However, in the swampy soil of the Loop, these footings proved quickly inadequate. At the very least, they added significant weight to the building itself, and their efficacy had to be crudely estimated - many Chicago buildings of the era display a noticeable difference in floor and sidewalk level, indicative of foundation engineering that was more guesswork than science. These pyramids, however, also took up valuable basement space, an increasing problem as boilers and, eventually, electrical equipment found a natural home in this otherwise undesirable location. The use of steel or iron grillage, borrowing surplus locomotive rails to spread the load of piers horizontally instead of diagonally, was a major innovation in foundation technique, allowing greater point loads on individual columns, which led in turn to the possibility for wider column spacing and, thus, larger building apertures. Concentrating a building's weight on ever more remote point supports therefore had two related benefits: a lighter, airier structure and greater opportunity for light gathering between columns (Jenney, n.p.).

As I have suggested elsewhere, the role of plate glass in this pursuit of free daylight was formally determinant for building skins of the era (Leslie). Jenney, in fact, credited the need for daylight in office interiors with the invention of the grillage foundation. But the glass skin relied, perhaps obviously, on glass itself, and this was not in great supply in Chicago in the 1880s. In fact, plate glass was something of a luxury item, reserved for shop windows and, in smaller dimensions, windows of luxury hotels. Most commercial architecture of the 1880s used hand manufactured Crown or Cylinder glass due to plate's high cost (*Industrial Chicago*, p. 793.)

Plate glass required two distinct manufacturing steps at the time ("American Plate Glass Industry", p. 151.) First, silica had to be fired until molten, at about 1650°C. This required an enormous amount of fuel, usually in the form of natural gas. Once molten, the glass was poured onto a casting table, where it had to be cooled slowly to avoid cracking - often requiring the glass to be re-fired. After cooling, the plate needed extensive grinding and polishing, a labor and time-intensive process to remove the rough surface left, inevitably, by the robust casting table. Despite its laborious process and subsequent high price, polished plate was used extensively in certain towns and cities in the Ohio River Valley, which had access to the country's major glass production facilities around Pittsburgh, where natural glass was plentiful. The discovery of extensive natural gas reservoirs in

northern Indiana in the late 1880s led inexorably to the relocation of much of the country's plate glass production, in particular the Diamond Plate Glass Company, which built a new plant outside of Kokomo shortly after the gas vein there was first tapped (Hovey, p. 241.)

While documentary evidence of Indiana glass' effects on Chicago architecture remains a topic for further research, there is a very suggestive change in the city's skyscraper skins almost immediately after production in Indiana began. Larger bay windows of plate glass appear by the end of 1892, in particular in the Ashland Block by Burnham & Root. But the full impact of locally produced plate glass would be seen only by 1895, when designs that had not yet been on the drawing boards when Diamond Plate and other glass companies began production in 1891 began to appear. This coincided with a period of economic depression throughout the country; few buildings were built even in the relatively healthy climate of Chicago. But those that were displayed radically different skins than those of just a few years before. The bay windows that distinguished early curtain wall buildings such as the Pontiac or the Caxton blossomed suddenly. No longer were windows conceived as punched openings in a largely masonry envelope. (Of these transitional buildings, two make particular claims as important developments in skyscraper construction - the Manhattan Building by Jenney (1890) and the Masonic Temple by Burnham and Root (1892) are both transitional buildings, with skeletal construction and curtain wall enclosures with projecting bay windows. However, the punched nature of their skins and the primacy of masonry in their construction both mitigate their status as genuinely modern technical conceptions. This, as with all other claims discussed herein, is highly arguable.) With the advent of relatively cheap plate glass and the accompanying development of exterior-grade, glazed terra cotta, Chicago buildings of the mid-1890s instead appeared as shimmering, lightweight, largely transparent skins draped over the skeleton frames that had been developed in the decade previous. I would argue that this synthesis - of light skin and skeletal structure - represents a more completely conceived antecedent to the twentieth century skyscraper than the mere fact of the skeleton frame alone.

The first of these to be built was the Reliance, at the corner of State and Washington, designed by Daniel Burnham and Charles Atwood. A purely speculative venture, the Reliance had origins that belie its eventual status as a canonical forbear of the International Style. Burnham and Root designed a four-story building that was built on the site in 1890. Its owner decided shortly thereafter to build a tall lettable office building, and the phased construction that followed was just the first of several technical advancements that the Reliance achieved. Foundations for a sixteen story tower and a new first floor were built *underneath* the three stories of offices in 1890, to designs by Root ("The Reliance Building", p. 17.) Plans, however, stalled as leases in the building ran through 1894. Root's death, and the assumption by Atwood of Burnham's partnership, led to a new design, apparently influenced by newly available materials. While the rather heavier first story of the existing building was maintained as a storefront, the sixteen story steel frame was erected above a protective platform built over the sidewalk. Despite this complicated arrangement, the frame was finished in twelve weeks, from May to August, 1894, and the building closed in on

November 8, 1894. Tenants began occupying the building on New Year's Day, 1895 (ck), making the total construction time a mere eight months.

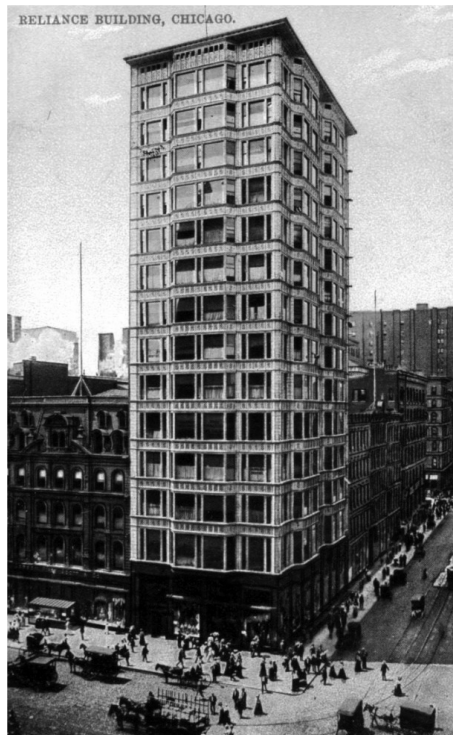


Figure 3. The Reliance Building, State St. and Washington St., Chicago, IL. Burnham & Atwood, 1895.

The speed of frame construction, however, was nothing new in Chicago. What made the Reliance so extraordinary was its radical skin. Perhaps nervous about the existing foundations, Atwood eschewed masonry and stone throughout the upper floors, using instead enameled terra cotta. This was a wise choice, as it allowed the building to be cleaned regularly. But it also permitted extraordinarily thin building panels, which in turn allowed the great sheets of plate glass that came to define the Reliance as a preternaturally light, transparent building. *Scientific American* reported that the Reliance's windows had been "made as large as the situation of the columns would allow." ("The Reliance Building", p. 17.) Indeed, New York critic Barr Ferree found the composition "unsatisfactory" due to its direct expression of the thin metal frame behind:

The Reliance Building...is, perhaps, the most notable attempt yet made to reduce the amount of the inclosing material to a minimum, and the design is scarcely more than a huge house of glass divided by horizontal and vertical lines of white-enameled brick.

(Ferree, p. 35.)

Other critics, notably Charles Jenkins of *Architectural Record*, gave the building more credit, noting that its skin was “purely commercial” and thus deserved only the “little elaboration”; Atwood gave it a nominal French Gothic style with fluted terra cotta columns and mullions that visually emphasized the building’s 200-foot height (Jenkins, p. 300).

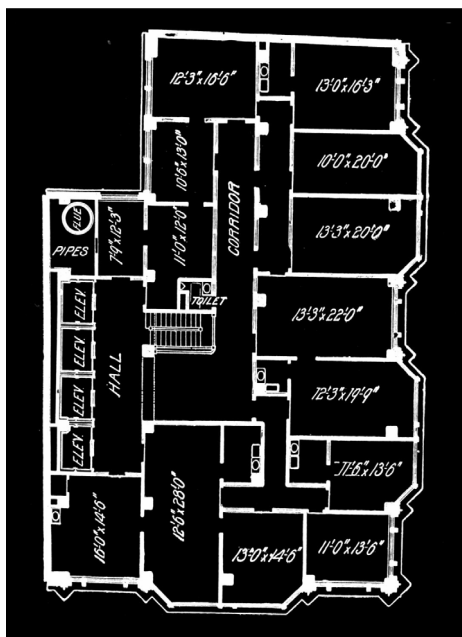


Figure 4. Plan of the Reliance Building.

By far the most provocative statement about structure and skin made by Burnham stemmed from an apparent compositional problem on the Reliance Building’s east façade, facing State Street. Here, a short leg of the lot line - only 55’-10” - had been divided by the first, four story project into four bays, leaving a column in the middle of the façade. While this had been compositionally acceptable for a short building, Atwood recognized the inherent aesthetic problem with a column on the central bay of a tall building. Given this preference, Atwood’s solution took advantage of the divorce between skin and frame. Rather than single-bay windows poking out from between the frame elements, the Reliance’s skin here consists of a double bay window, spanning in front of the troublesome central column. On the east façade, this cantilevered double bay thus forms a compositionally desirable void in the center of the elevation, while providing tremendous quantities of light to the spaces behind. That this was an aesthetic decision is confirmed by the functional difficulties presented on the upper floors. Typical floor plans indicate partition walls at every column, with the result that an awkward stub wall must protrude from the column in question, meeting up with a small mullion set to either side of the bay’s centerline. Nonetheless, Atwood continued this trope around the north side of the building, with two large double-bay windows on



each floor, awkward central partition included, running the full height of the building. Nothing could state more clearly the new tectonic conception inherent in the Reliance; the curtain wall here is measurably, experientially distinct from its frame, a wrapper rather than an infill. This, more than the Home Insurance or even the Tacoma, anticipated in all but its ornament the standard recipe of the twentieth century skyscraper, namely a skeleton frame wrapped by a physically distinct, lightweight, largely glazed, entirely non-structural envelope.

If the Reliance's curtain wall represented a resource-driven advance over the somewhat cruder envelope of the Tacoma, however, its framing possessed the same hybrid quality as its forbear. While the Reliance's steel frame, engineered by London structural expert Edward C. Shankland, used an advanced system of rigid connections and plate girders to channel wind loading through the "table leg" principle, its corner site meant that it also relied on two party walls along the lot lines for fire protection, which provided no small measure of structural support and lateral bracing for the building's first few stories. (Contemporary photography of the Reliance's construction (published in William Birkmire, *Planning and Construction of High Office Buildings* (New York: Wiley and Sons, 1900) 63, shows the Reliance's skeleton standing, without party walls, and the building's structural reliance on these solid masonry elements remains, admittedly, a question for further study.) It could, therefore, be argued that despite its technically advanced, lightweight skin, the Reliance also did not meet the structural prejudices of the Tallmadge committee. It remained dependent on relatively crude masonry walls for a good portion of its structural integrity.

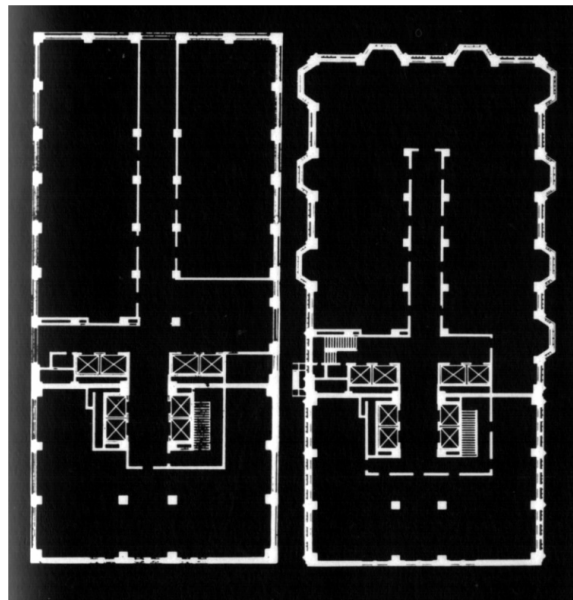


Figure 5. Plan of the Fisher Building, Dearborn St. and Van Buren St., Chicago, IL.  
Burnham & Atwood, 1896.

Few sites in the Loop, however, could accommodate a building *without* party walls. Chicago's blocks are large - over 110 metres per side, and most speculative buildings occupied only a fraction of this. Tallmadge's criteria for a truly modern skyscraper, with the insistence that no masonry walls participate in the achievement of the structure, seems an unlikely requirement for buildings that would, necessarily, have required fireproof party walls. Home Insurance took up an entire quarter block, with alleys on its north and east sides. But the Loop does have one street - Dearborn - that is backed up by an oversized alley, Plymouth Court. Here, a relatively small building could in fact occupy at least three sides of a block with relative ease, and in 1895 Burnham received the commission for the Fisher Building, another speculative office building that was to occupy the southern half of a narrow block at the corner of Dearborn and Adams. The presence of a small building to the immediate north of the site meant that the Fisher required little in the way of party walls. It benefited, too, from the newly ascendant use of terra cotta (or "hollow tile") as a lightweight partition material, and, again, from the availability of relatively inexpensive plate glass from northern Indiana. The Fisher was built between June 27, 1895 and April 23, 1896, a period of less than a year. It set a record for steel framing, as its nineteen upper stories were completed in twenty-six working days, including a stretch of good weather during which a story of framing was set each day. While a tribute to the contractors, the Guaranty Construction Corporation, this was also due to the use of shop fabrication and riveted construction. Steel elements were test-fitted before arriving on site, guaranteeing a constant flow of work with no delays for faulty or ill-fitting material ("Technical Review", n.p.) In plan, the building was simpler than the Reliance or the Tacoma. A rudimentary core containing six elevators, two staircases, ventilation and electrical risers, and toilet rooms, was located at about the northern third point of the site. From this core, a T-shaped corridor provided access to open, loft-like office spaces on either side of the building. The only columns in the interior flanked the long leg of this corridor; inside the rental spaces nothing obstructed the planning of offices or the diffusion of light from bay windows on the east, west, and south facades. Wind bracing was accomplished by stiff moment connections within the riveted steel frame rather than large walls, and the resulting floor plan is uncannily free of disruption, anticipating central core buildings of the 1950s in layout, proportion and emptiness. Yet its materials and systems were typical of the day:

It goes without saying that such a building is fireproof; that all constructive steel work, on which its whole strength depends, is protected with hollow fireclay tile; that the floors are of a similar material, being flat arches, on the latest and strongest end pressure system, and that the partitions are also of hard hollow fireclay tile of the lightest pattern. These, with the sanitary electric and heating appliances, which will be described more in detail later on, are all of the latest and most approved patterns. The floors of the halls are of marble mosaic, and those of the rooms are of white maple, and whatever of inside finish in wood...is of polished mahogany.

("Technical Review", n.p.)

The Fisher Building received greater press notice in the Midwest than the Reliance, in part for its rapid construction and the fact that its exterior was assembled beginning with the middle floors - a striking sight for those used to seeing bearing walls built from the ground up. But it won recognition, too, for its virtually transparent skin and for its extraordinarily lightweight construction: "In the evolution of the modern office building," claimed Inland Architect, "there is nothing more wonderful than that the fact should have been accomplished of erecting a building literally without walls."

...here, for what we believe to be the first time in human experience, one of the highest commercial buildings in the world has been erected almost without any bricks....The fronts are covered with cellular terra cotta on the outside, not in imitation of a wall, but following upward the steel supporting members, and closing in the transoms between the windows, leaving two-thirds of the exterior to be inclosed with glass.

("Technical Review", n.p.)

That this accomplishment drew as much notice as previous height records had won suggests that the architectural press was well aware of what had been accomplished at the Fisher. Wind bracing was achieved, as in the Reliance, by oversized plate girders rather than shear walls as in the Tacoma, and the terra cotta and glass exterior enabled offices within to take advantage of daylight. The Fisher Building

...overshadows all of its tall and stately neighbors. This admirable site has been employed to such advantage that all of the rooms and corridors throughout the building receive direct and uninterrupted light....All offices have exterior light, and it was not necessary to vary the exterior outline except in the construction of bay windows above the second story, which may be found in every room from the third to the seventeenth story, inclusive.

("Technical Review", n.p.)

Here, then, is perhaps Burnham's most overlooked achievement, a skeleton framed, curtain wall building whose construction, layout and fabric all looked forward half a century to the thin-skinned, vitine-like recipe of the post World War II curtain wall skyscraper. The Fisher's overeager ornament and its deep color made it a less aesthetically acceptable model for those who looked for a precursor to the purist ideals of the International Style, and this is where the Reliance gained its greater fame. But the Fisher stakes a legitimate claim on the first synthesis of these fundamental ingredients for the 'modern' skyscraper: a lightweight, skeleton frame, a wind bracing system that is entirely reliant upon steel connections, and a thin, largely glass skin. Less renowned than the Home Insurance, less aesthetically striking than the Reliance, the Fisher nonetheless was arguably the most radical of the three in its combination of height, transparency, and light weight.



Figure 6. Exterior view of the Fisher Building.

The advanced servicing of the Fisher, however, contained the seeds of the Chicago curtain wall skyscraper's temporary demise. For, in addition to its lightweight skin, the Fisher building employed the latest in electric technology - dedicated risers and shafts, on-floor cabinets for meters and rudimentary panels of switches, and iron conduit laid within the concrete topping slabs and tile partitions on each floor to distribute power to all areas of the building. The rapid acceptance of electrical service in buildings, the implosive decline in electric rates led by Chicago Edison, and the eventual perfection of the tungsten filament combined with sharp rises in glass prices to render the economic formula of the highly transparent curtain wall moot in the economic and environmental climates of Chicago (Platt). Large plate glass windows offered excess heat in the summer and little insulation in the winter. They allowed massive amounts of sunlight - and thus glare - in during the mornings or afternoons on east and west-facing facades. And they presented an ongoing maintenance issue in the soot-infested street environments of the Loop. Images of these buildings from the era invariably show them dressed with large awnings that offered some measure of relief from the summer sun, but the environmental penalties created by plate glass windows. The gradual rise in American plate glass prices from 1899-1920 combined with the exhaustion of northern

Indiana's gas reserves to temporarily extinguish the crystalline curtain wall as a type - until other technologies enabled their instantiation in Chicago's challenging climate. (One final building is worth noting for the extremity of its cladding solution. While Burnham and Atwood perfected the aesthetic expression of large sheets of glass with lacy terra cotta interstices, Solon S. Beman executed his second commission for the Studebaker Company, a 12 (?) story loft office building on South Wabash Avenue. This was nowhere near the Reliance or Fisher in its overall conception - it was an infill building with party walls on its sides and only a single major elevation. Yet this elevation far surpassed either of its glassy peers in its deployment of plate glass. Beman, who had employed extensive amounts of expensive plate glass from Crystal City's plants in the 1886 Studebaker Building (now the Fine Arts Building) on South Michigan, exploited the material's sudden affordability with dramatic - if aesthetically mixed - results in the company's new headquarters.)

The Fisher Building makes a compelling - and provocative - claim on 'first skyscraper' status if we take seriously the role of cladding in determining the type. It has a true skeleton frame, with virtually no load bearing masonry in its fabric, it reaches a suitable height, it deploys a lightweight skin carried outboard of its skeleton structure and responsive to interior requirements for light and air, and it contains a concentrated zone of environmental, plumbing, vertical transportation and electrical servicing. This is precisely the formula for countless 'modern' skyscrapers of the twentieth century, albeit with more advanced environmental control, greater access to increasingly refined plate glass and a greater consciousness of fire safety and exiting (note the unprotected stairs in the Fisher's floor plan). It might also be noted that this is a somewhat more satisfying claim aesthetically, for while we may honor Jenney's Home Insurance Building for its engineering advance, its appearance is hardly prescient of the twentieth century's preferences for clean forms, sharply delineated volumes and minimal ornament. Still, this proposal is, as all other 'first skyscraper' claims have been, splitting hairs, finding a formula that frankly suits an author's preference and thereby eliminates other contenders. Depending on how this formula is posed, the Tacoma, the Home Insurance, the Reliance or the Fisher might each be considered 'the' pioneer building. In fact, the type's evolution through changing economic environments and various recipes balancing material resources with functional requirements suggests that such an exercise is futile at best, and obscuring of other, important social and cultural factors at work.

Is there, then, anything to be gained by continuing this admittedly pedantic parlor game of determining the "first skyscraper"? In considering the Fisher's claim, I would suggest 'first' does not necessarily have any real importance. Technically derived building typologies are inevitably evolutionary occurrences, and to claim priority for one individual or building over another continues the unfortunate emphasis of traditional histories on individual examples rather than on social and economic forces and trends. Rather, I believe that such a claim points out the complexities of the skyscraper type that were willfully ignored by the Tallmadge Commission - in particular to do with the rapidly changing nature of the building skin. That Tallmadge was

essentially charged with finding a rationale for making the Home Insurance an important engineering landmark seems to have led to an emphasis on one material cause - the skeleton frame - and a willful ignorance of others - the glass skin especially, but also developments in servicing, vertical transportation and fire safety to name but a few. The results of this limited review of material facts and conditions left out a history parallel to that of the skeleton frame, prioritizing the engineering achievement of Jenney over the constructional and architectural work of Burnham and others.

Like all other building types, the skyscraper is a balance of resources with needs, inevitably a weaving together of available materials and techniques with the performance requirements of developers and users. Seen in this light, the skeleton frame was a *partial* answer to a very real problem facing speculative development in the 1890s. How buildings could maximize their multiplicative rental effects through height and bulk needed to be balanced with, among other things, the need to lighten their foundation loads and to economically illuminate their interiors. Particularly under the financial pressure of the 1890s depression, developments in the Loop had to find a careful balance of bulk with transparency. The maximization of elevational apertures to provide daylight to interior spaces was only possible with two developments - that of the skeleton frame, which slimmed down columns, girders and floor plates, and the glass skin, which offered transparency and enclosure in a material - plate glass - that was made briefly affordable by the geographic coincidence of the Indiana gas fields. As economic conditions changed, as electricity became cheaper in particular, the skeleton frame remained a universal technique, but the glass skin temporarily receded in favor of more environmentally appropriate solid walls. It would take other developments in the glass industry—notably a further mechanization of the finishing process and a relocation of manufacturing to north-central Illinois—and in environmental control to bring the glass skin back to Chicago in full force after World War II.

This study has minor but intriguing implications for the study of Chicago's architectural history. It suggests, for example, that Burnham's traditional status as one of the city's great stylistic turncoats may be ill-deserved considering his logical adherence to technically efficacious forms and developments throughout his stylistically peripatetic career. Likewise, Jenney's role in the city's architectural development suffers in this view from his failure to adopt the curtain wall in his later work despite its technical feasibility and eventual acceptance. These minor adjustments, however, hardly alter the course of the city's heroic mythology. Rather than seeing the explosive developments in the Loop during the late nineteenth century as a nascent stylistic battle, this study suggests that these buildings were all essentially laboratory experiments in finding appropriate formal and compositional methods for dealing with newly determined typologies. The appearance of building science and technology in this story, and its implications, have long been paid lip service by traditional histories of Chicago, but an adherence to the actual industrial and material conditions of the day reveals a rich, largely untapped source for a revised history of these important structures and their skins.

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