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# A Japanese Inspiration for Frank Lloyd Wright's Rigid-Core High-Rise Structures

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*Frank Lloyd Wright's rigid-core high-rise structures, initiated with the project for the National Life Insurance Company building of 1924, have their closest structural and iconographical analogue in one type of Japanese pagoda, exemplified by that at Horyu-ji. This association signals a previously undetected instance of Japanese influence on Wright's work.*

THE PREMATURE NEWS that Frank Lloyd Wright's earthquake-proof Imperial Hotel had collapsed in the Tokyo earthquake of September 1923 undoubtedly gladdened all who had taken satisfaction eleven years earlier in the sinking of the "unsinkable" *Titanic* on her maiden voyage: claims of invulnerability to natural disasters for the works of man inspired in many a secret hope that such hubris would be punished by divine wrath. Yet, as the confusion instigated by the catastrophe in Japan subsided and communication with the outside world resumed, the world was astonished to learn that the hotel, riding on its concrete "pincushion," had not only withstood the shock that devastated much of the city but had also escaped virtually unscathed.<sup>1</sup> Overnight Wright became an international celebrity, an architect of heroic stature. The obvious gratification that such an incident would provide anyone henceforth raised in him a heightened expectation of what the world owed him in the way of admiration and of what he owed the world in the way of inventive creativity. It is not surprising, then, that during the subsequent year he devised yet another structural system for

This paper grew out of a conversation with my colleague, Sandy Kita, a specialist in Japanese art. I am indebted to him for calling to my attention the "heart pillar" of the Japanese pagoda and the bibliographical items on Japanese architecture.

1. Wright's principal account of this event is recorded in *Architecture and Modern Life*, which he coauthored with Baker Brownell, New York, 1937, 134–136. For the actual condition of the hotel after the earthquake, which sustained "minor damage" rather than surviving wholly unscathed as Wright claimed, see the letter to the editor by Richard R. Bradshaw, headed "Dissent on Imperial," in *Architectural Record*, CXXIX, January 1961, 10, 242. It has never been remarked upon before that Wright had received letters from Endo Arata, dated 8 September 1920 and 8 February 1923, reporting that the hotel had survived without notable damage during less catastrophic earthquakes. See *Frank Lloyd Wright, an Index to the Taliesin Correspondence*, ed. A. Alofsin, 5 vols., New York, 1988, I, *Chronological Index, 1885–1946*, 20.

earthquake-proof architecture<sup>2</sup>—a tree-like, high-rise structure with rigid core and cantilevered floors—in the project for the National Life Insurance Company building in Chicago.<sup>3</sup>

In the conception of this skyscraper, Wright was prompted by the commission of his client, Alfred Mosser Johnson, president of the corporation, to create an earthquake-proof office building.<sup>4</sup> Although Johnson's motive in doing so has never been divulged, it was clearly in the interest of a life insurance company to employ and promote safer architecture even if purely for the sake of public image. For Wright, such a commission was a major opportunity, and he was determined to make the most of it. Feeling good about his work and himself (despite distracting difficulties in his private life), he rose to new heights of inventiveness. He had just defined the requirements for earthquake-proof high-rise construction in "Experimenting with

2. Although Wright claimed in the second edition of the *Autobiography*, New York, 1943, 259, that he had designed the National Life Insurance Company building in 1920 and that he had had the scheme in mind since 1917, this was almost certainly a slip of the memory in late life: all earlier and later accounts of the building (except those based primarily on the *Autobiography*) place the commission and the design in 1924. For this date see especially *Frank Lloyd Wright, Monograph*, ed. Y. Futagawa and B. B. Pfeiffer, 12 vols., V, 1924–1936, Tokyo, 1985, 1. Indeed, the only known correspondence with the client, A. M. Johnson, is dated 19 July 1924: see *Frank Lloyd Wright, Index to the Taliesin Correspondence*, I, 24. Wright had already designed yet another type of earthquake-proof structure, that of a grid of steel rods embedded in the masonry of textile block walls, in 1921 for the Doheny Ranch, which was not built; this system materialized in 1923 in La Miniatura, the second house for Alice Millard; see Henry-Russell Hitchcock, *In the Nature of Materials: The Buildings of Frank Lloyd Wright, 1887–1941*, New York, 1942, 95.

3. Wright's detailed account of this commission is in the second edition of *An Autobiography*, 256–259.

4. The issue of earthquake-proofness is only indirectly stated in the *Autobiography*, when Wright recalled that Johnson was interested in the cantilever because the use of that structural principle had brought the Imperial Hotel through the earthquake (p. 254). At this point in his narrative, Wright was leading up to a quotation of praise from Sullivan for the design of the National Life Insurance building as the artistic realization of Sullivan's high hopes for a modern architecture (p. 259). Hence Wright had no reason to emphasize earthquake-proofness in that context. He referred to the building's earthquake-proofness in *A Testament*, New York, 1957, when he compared its structural format to that of the Price Tower (p. 196) and of the Price Tower to the mile-high "Illinois" project (p. 239).

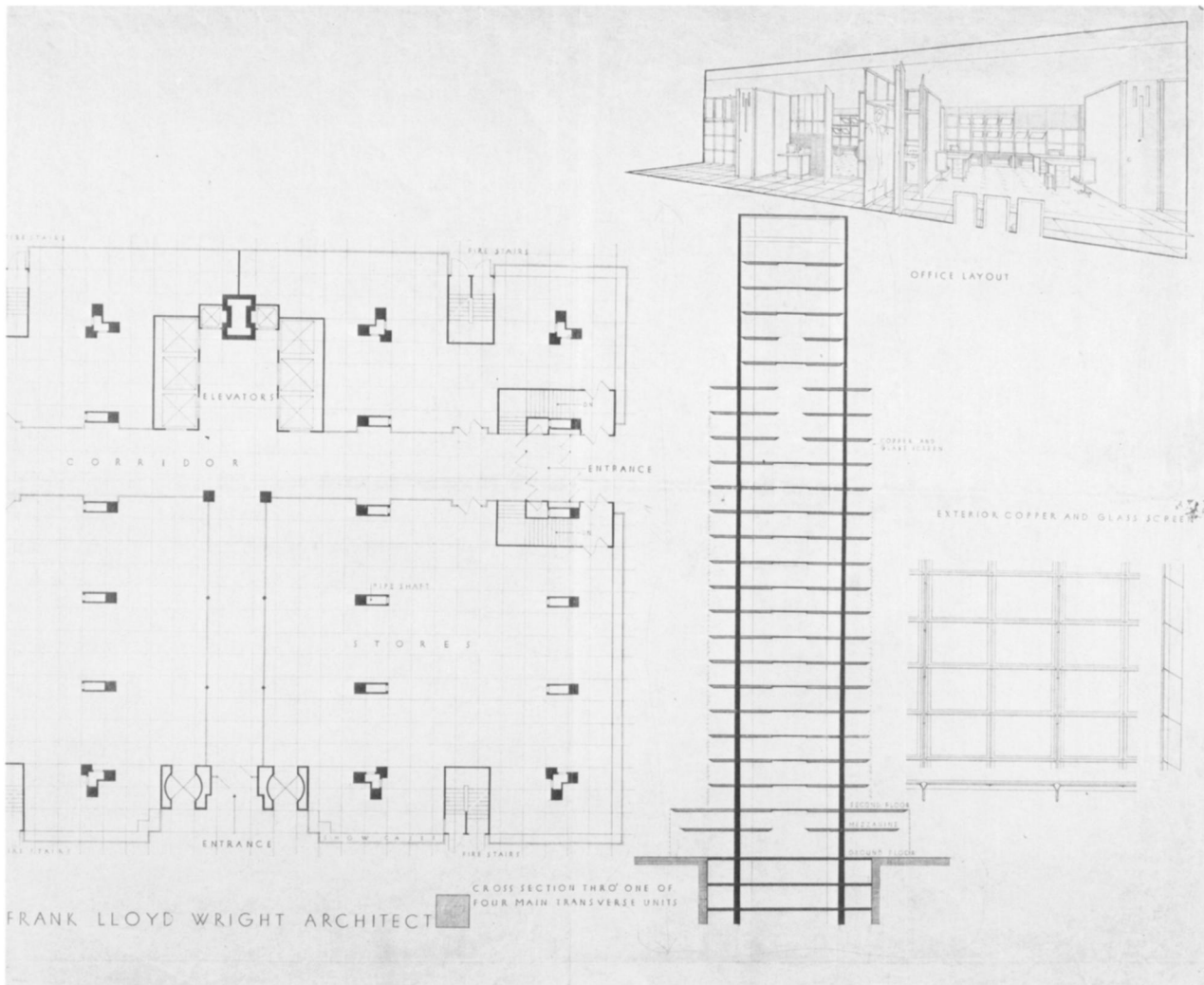


Fig. 1. Frank Lloyd Wright, Project for the National Life Insurance Company, 1924, showing the cross section through one of the four main transverse units (Copyright © The Frank Lloyd Wright Foundation 1942).

Human Lives,” a pamphlet written in 1923 for the Fine Arts Society of Hollywood: “Tenuous flexibility is the chance for life of any sound construction in an earthquake: flexibility of foundation, flexibility of superstructure secured by continuous, lateral, binding integuments from side to side in the floor planes of the structure, and balancing of all loads well over vertical supporting members by means of the cantilever.”<sup>5</sup> He already knew, therefore, how he meant to proceed.

Wright’s scheme for the National Life Insurance Company called for four parallel slab towers, set perpendicular to the street, intersecting a megaslab, the whole sheathed in curtain walls of glass and copper panels. Such an exterior treatment was possible because the supporting structure was on the inside: each of the slabs was composed of two rows of tree-like rigid cores with concrete floors cantilevered from them (Fig. 1). Corresponding

floors of adjacent cores were to be connected by a thin bridge-plate. Each core constituted a semi-independent structure that could be shaken without pulling on other parts of the building. The cores themselves were to be rooted deep in the earth so as to give maximum stability to the vertical trunk, in the manner of the tap root of a tree.<sup>6</sup>

It is crucial to observe that Wright’s designs for high-rise buildings prior to 1924 involved structural principles very different from those employed in the National Life Insurance Company project. The Romeo-Juliet windmill, designed in 1896 for his aunts Nell and Jane Lloyd Jone, was composed of two intersecting hollow tubes, one lozenge-shaped and the other hexagonal, mounted on an outward-sloping foundation of stone.<sup>7</sup> The *San Francisco Call* project of 1912, on the other hand, was

5. Cited in *Frank Lloyd Wright on Architecture: Selected Writings, 1894–1940*, ed. F. Gutheim, New York, 1941, 99.

6. Wright explained this scheme in the second edition of the *Autobiography*, 256–259.

7. *Ibid.*, 134, 137.

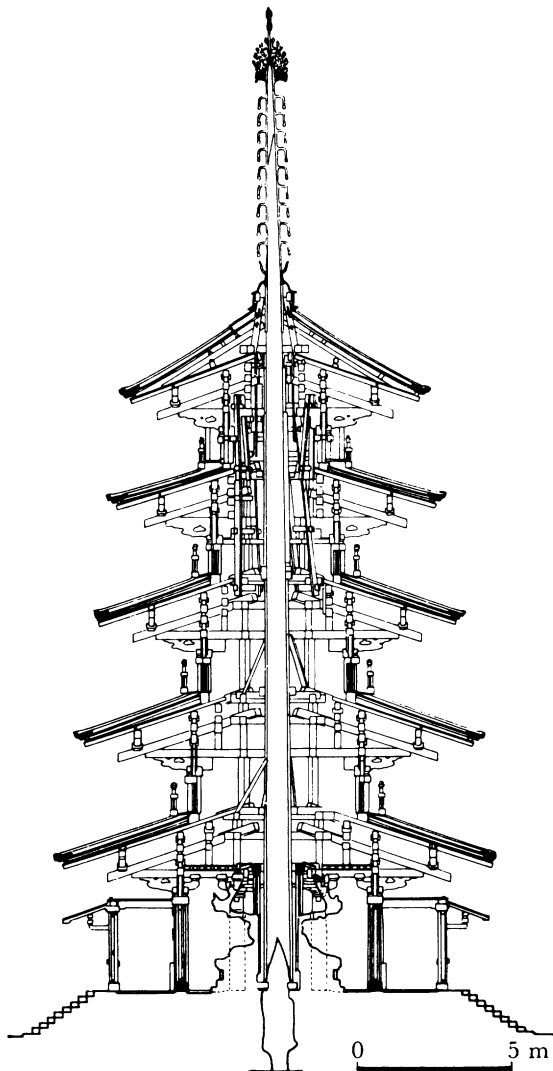


Fig. 2. Pagoda of Horyu-ji, seventh and eighth centuries, cross section (Courtesy of Heibonsha Publishing Co., Tokyo).

rather similar to the two great towers by Wright's mentor, Louis Sullivan, the Wainwright and Guaranty Buildings. Although intended for reinforced concrete rather than steel, the *Call* tower, like the Sullivan structures, was conceived as a cage frame, with its supporting members articulating the elevation of the building.<sup>8</sup> Designed a mere six years after the great earthquake that destroyed San Francisco, the *Call* tower was undoubtedly meant to be as nearly earthquake-proof as possible. The difference between that design and the one for the National Life Insurance Company, then, is all the more significant of Wright's new thinking after the intervening sojourn in Japan and his work on the Imperial Hotel.

Although the Imperial Hotel deeply involved Wright in concern about structural earthquake-proofness, the scheme for that project was unrelated to the one for the insurance company,

8. Frank Lloyd Wright, *Monograph*, ed. Y. Futagawa and B. B. Pfeiffer, 12 vols., III, 1907–1913, Tokyo, 1987, 447–448.

except that they both employed the cantilever principle. Indeed, the basic idea for each seems to have been transported in different directions across the Pacific Ocean to the opposite shore: the inspiration for the “pincushion” of concrete posts that was poured into the swampy mud in order to ground the foundation platform of the hotel, heretofore not attributed, can be identified in the writings of Wright's hero in architectural theory, Viollet-le-Duc;<sup>9</sup> conversely, the rigid-core skyscraper seems to have been inspired by an indigenous Japanese structure.

As is well known, Wright had espoused a special interest in and regard for the architecture of Japan since seeing the Ho-oden at the Columbian Exposition in Chicago in 1893. There can be no doubt that, during the years when he resided primarily in Japan (1917–1922), while working on the Imperial Hotel, he was both interested and attentive when he had the opportunity to see something new to him in Japanese architecture. (He acknowledged, for instance, that he got the idea for the heated floors of his Usonian houses from Baron Okuda's “Korean room,” with its warm-air ducts beneath the floor.)<sup>10</sup> Therefore, when the occasion for an excursion to major sites of Japanese religious architecture arose, he would certainly have welcomed it. One of the most likely candidates for such an experience would have been the oldest sanctuary in Japan, the Horyu-ji shrine near Nara, preserved from the seventh and eighth centuries.<sup>11</sup> Waiting there for Wright's attention was a feature in the pagoda that had been consciously adopted from China to help the tower withstand the shock of earthquakes: a rigid central member, or “heart pillar,” acting as a mast (Fig. 2).<sup>12</sup>

Sunk deep into the earth, where it was mounted on stone, this pillar stood free within the structure, ready to offer support when the pagoda should sway, due to either earth tremors or heavy winds. The succession of roofs that mounted upward in a vertical stack was composed of a complex combination of

9. The foundation of the Imperial Hotel consists of a concrete platform poured on top of a forest of short concrete piles. Its concept combines the two methods discussed sequentially by Eugène Viollet-le-Duc in the *Discourses on Architecture*, 2 vols., trans. B. Bucknall, London, 1882, reprinted 1959, II, 18–19: (1) construction on a foundation of piles driven into soft ground, and (2) construction on a concrete raft floating on soft ground. Wright's enthusiastic reliance on Viollet-le-Duc as theorist has been most usefully documented by Donald Hoffmann in “Frank Lloyd Wright and Viollet-le-Duc,” *JSAH*, XXVIII, 1969, 173–183.

10. F. L. Wright, *The Natural House*, New York, 1954, 88–89.

11. S. Mizuno, *Asuka Buddhist Art: Horyu-ji*, trans. Richard L. Gage (The Heibonsha Survey of Japanese Art, 4), New York, 1974, 88–89. By coincidence, Jonathan Lipman, in *Frank Lloyd Wright and the Johnson Wax Buildings*, New York, 1986, 130–131, invoked a comparison of the composition of the Racine complex with that of the Horyu-ji, even citing the similarity of the cantilevered roofs of the pagoda with the cantilevered floors of the research tower. However, he drew no conclusion of actual influence, and he did not attribute the inspiration for Wright's rigid-core structure to the “heart pillar” of the pagoda.

12. Mizuno, *Horyu-ji*, 101–102.

members that produced a series of dramatically cantilevered forms. Because the implied upper stories were never accessible in Japanese pagodas (unlike those of China), Wright could not have had any opportunity to study their structural composition up close.<sup>13</sup> Consequently, even though the principle of independence between the pole and the succession of roofs would probably have been explained to him at the time, the residual impression may well have been one of a series of cantilevered projections jutting out from a central spine. In all likelihood, Wright's introduction to this architectural monument would have been arranged by a member of the building committee for the Imperial Hotel. Both the motive of Wright's host in exposing him to the constructional system of the pagoda and the importance of the example in his memory would have been linked with their mutual interest in his producing an earthquake-proof architecture in Tokyo. However, in view of the deviation of Wright's eventual adaptation of the principle from the actual formulation of the original, it is of some importance that the occasion for the adaptation presented itself in 1924, at least two years and probably more after he could last have seen pagodas in Japan.

The central spine of a pagoda serves not only a functional purpose against earthquakes but also an iconographical one. This feature, common in Japanese pagodas, originated not in its Chinese predecessor but in their common ancestor, the Indian stupa, where the central spine is associated with the cosmic pillar or tree, regarded as identical with the Tree of Enlightenment.<sup>14</sup> Such an association in Buddhist thought remained alive in Japan, and Wright's association of his high-rise structural scheme with a tree may reflect either a conscious or an unconscious memory of the explanation of the pagoda.

The tree simile was later expressly employed by Wright to explain his high-rise structural formulation, albeit in connection with the Price Tower, another rigid-core high-rise project.<sup>15</sup>

13. D. Seckel, *The Art of Buddhism*, New York, 1963, 121–122.

14. *Ibid.*, 128.

15. Wright underlined the tree analogy for this structural scheme in *A Testament*, 196, in a discussion of the Price Tower of 1956, when he harks back to the St. Mark's-in-the-Bouwerie project of 1929 and the National Life Insurance project of 1924.

The implication was that his concept of the rigid-core principle was based on observation of nature. Perhaps from the perspective of 1932, when he first published the *Autobiography*, Wright's tall buildings in general seemed to have had such an inspiration; certainly he *said* he had thought in terms of the difference in wind resistance shown between trees with roots spread out and those with a single deep taproot when he designed the Romeo-Juliet windmill in 1896.<sup>16</sup> Quite apart from the question of the aptness of the analogy in regard to the windmill, it is important here only that in retrospect Wright appealed to examples in nature to explain his ideas for high-rise construction.

Without explicit documentation, the attribution of the pagoda spine as the source of inspiration for Wright's rigid-core high-rise structures can be based only upon circumstantial evidence. The lack of documentation, however, could be due to his covering his tracks. Given all the occasions Wright devised for explaining his architecture, he never came close to attributing the inspiration for his radically innovative skyscraper structure to a prototype in Japanese architecture. He may have had good reason to do so: while it had been perfectly acceptable for him to acknowledge a Japanese source for his concern with interrelating the indoors and outdoors in his architecture, the notion of basing the structure of a skyscraper on that of a pagoda would probably have been regarded as ridiculous in professional circles as well as by clients and the general public. It was far more prudent for him to go beyond the building type to its arboreal meaning, thereby seeming to credit unimpeachable Nature as his muse. In support of this interpretation is the absence of anything like Wright's structural scheme in all of Western architecture, while the Japanese pagoda offers the combination of formal similarity and functional motive. Given the context and the series of circumstances immediately preceding Johnson's commission, the most plausible source for the rigid-core scheme is in the architectural tradition Wright respected more than any other.

16. F. L. Wright, *An Autobiography*, New York, 1932, 135.