

# Tokyo 1964–2020: The Olympic Sport Facilities of 1964 and their Roles at the Olympic Games in 2020 – With a Focus on the Work of Kenzo Tange

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## Tokyo 1964–2020

42 facilities/sites will be used during the Olympic Games “Tokyo 2020”.<sup>2</sup> Seven out of the 42 facilities were used at the previous Olympic Games in 1964. These seven facilities/sites include four buildings, i.e. the new National Stadium, the Tokyo Metropolitan Gymnasium Hall, the Yoyogi National Stadium, and the Nippon Budokan Hall. The three sites are the Kokyo Gaien National Park, the Asaka Firing Range and the Bajikoen Equestrian Park.

The Tokyo Metropolitan Gymnasium Hall was largely remodeled by Fumihiko Maki in 1990;<sup>3</sup> it will be used for table tennis. The Nippon Budokan Hall, designed by Mamoru Yamada, is one of the representative examples of Japanese modernism.<sup>4</sup> This Hall was built for and will be used again for Judo and Karate. The old National Stadium was demolished and the construction of the new Stadium was completed on the same site in 2019.<sup>5</sup> A design by Zaha Hadid was initially chosen,<sup>6</sup> but was cancelled due to budgetary reasons, and, after a new competition, a design by Kengo Kuma was selected. The Yoyogi National Stadium, one of the most representative works of Kenzo Tange, consists of two gymnasia. The large gymnasium was built for swimming and will be used for handball. The small one was used for basketball. All have been used for sports as well as other functions since 1964. From the viewpoint of material authenticity and the continuity of function, the Budokan Hall and the Yoyogi Stadium may be considered as heritage sites. This paper, however, focuses on the Yoyogi National Stadium.



Fig. 1 Mishii-no-Mikura storage in the Ise Shrine  
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## Kenzo Tange and the Yoyogi National Stadium

The Yoyogi National Stadium, a collaborative work of three contributors, i.e. Kenzo Tange, architect; Yoshikatsu Tsuboi, structural engineer; Uichi Inoue, mechanical and service engineer, is an outstanding example of Tange’s oeuvre, embodying the five characteristics of his works.<sup>7</sup> First, while Tange was inspired by Modernism introduced from Europe, especially by Le Corbusier, he also confronted the traditional Japanese aesthetic, for instance the Ise Shrine (Fig. 1). Second, to build symbols situated between life and death was an important theme for him. Hiroshima Peace Memorial Museum and Park is a good example of these two characteristics (Fig. 2). Third, his idea was to create an urban core for modern society. This aspect is well represented by the East Building of Kagawa Prefectural Government (1958). This work also represents Le Corbusier’s Five Points of Architecture (pilotis; free designing of the ground plan; free design of the façade; horizontal window; roof garden).<sup>8</sup> In this example, the first characteristic is also represented in this building. The fourth characteristic is the ingenious combination of structure and mechanical design. Before the Yoyogi Stadium, Tange had collaborated with Tsuboi, the above-mentioned structural engineer, to create buildings with a shell structure. One of the most successful and beautiful examples of shell structure is St. Mary’s Cathedral in Tokyo (Tokyo Cathedral).<sup>9</sup> The fifth characteristic is the creation of futuristic urban design. In 1961, Tange published “Tokyo Plan 1960” and argued that issues caused by the population concentration in Tokyo should be resolved



Fig. 2 Hiroshima Peace Memorial Museum, 1955  
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Fig. 3 Yoyogi National Stadium © Toshiyuki Kono



Fig. 4 Yoyogi National Stadium, Large Gymnasium © Toshiyuki Kono

with technology to achieve further economic development. In 1967, he proposed a three-dimensional city that would be suitable for an information society. This futuristic idea was materialised in the Yamanashi Bunka Kaikan Hall, with various functions<sup>10</sup> in one building.<sup>11</sup>

The Yoyogi Stadium embodies these five characteristics of Tange's works in the best form. According to Kawaguchi, Tange "never talked about what sort of architectural forms he pursued in his design. Many who visit the stadium, however, say that they sense something Japanese in its appearance (...) the outcome of his design has a strong essence of local tradition (...) Tange's design for Yoyogi Stadium isn't quite local, giving a strong impression of something Japanese, or more specifically, providing an atmosphere of the grand roofs of traditional Japanese architecture."<sup>12</sup> This view, which represents the first characteristic, can be easily confirmed when one compares his work for instance with the roof of the Todaiji Temple, a World Heritage property in Nara (Figs. 3 and 4).<sup>13</sup>

Tange successfully conveyed the heavenly world in St. Mary's Cathedral in Tokyo by the effects of top lighting.<sup>14</sup> The same effects were also created in the Yoyogi Stadium. When one enters the Large Gymnasium of the Yoyogi Stadium, one gets an impressive interior view created by its triangle-shaped ceiling and top lighting. One can find the above-mentioned second characteristic illustrated in this aspect.<sup>15</sup> A technological specificity of the Yoyogi Gymnasium is that the effects of top lighting were realised by a suspension roof, while St. Mary's Cathedral was built with a hyperbolic paraboloid shell structure with RC.

The third characteristic, creation of an urban core, was realised by its carefully crafted setting and zoning. The Yoyogi Stadium is located on a sloping terrain. Tange used this geographical condition and divided the compound into three levels. The ground floor level is where the south gate facing bustling Shibuya is located and where athletic activities take place. On the second level, offices of the stadium are placed. On the third level, the north gate of the compound faces the Meiji Shrine and its quiet forest, as well as nearby Harajuku Station. Tange created the "Michi-Kukan", a promenade



Fig. 5 Yoyogi National Stadium, Small Gymnasium © Toshiyuki Kono

connecting two gates and two gymnasias and promoting the smooth traffic of more than 10,000 visitors. By installing offices in the Gymnasium building without spoiling its silhouette, Tange created a building with multiple functions. This represents the fifth characteristic, i.e. futuristic urban design (Fig. 5).

The fourth characteristic, the ingenious combination of structure and mechanical design, was realised by integrating state-of-the-art technologies in structure and mechanics. Like the former, a large-span suspended structure, which was considered an innovation in civil engineering, was used to create a large-space building. Seismic dampers were adopted for the first time in Japan. Like the latter, the Stadium introduced indoor air conditioning with jet nozzles after many experiments using a 1/30 model.

### Potential values of the Yoyogi National Stadium

Since the Yoyogi Stadium is not a listed heritage building, no heritage value has been officially identified yet, but some potential values can be identified.

**(1) A symbol of recovery from WW II**<sup>16</sup>

The property where the Yoyogi Stadium currently stands was a military training ground of the Japanese Imperial Army before WW II and was occupied and used for residential purposes by the US Air Force after the war. This property was returned to the Japanese Government to construct the Yoyogi Stadium and the Olympic Village, and transformed into Yoyogi Park, of which the Yoyogi Stadium is an integral part. Due to the history of the setting, the Stadium can be interpreted as a symbol of international exchange and peace diplomacy through sports.

**(2) Functions**<sup>17</sup>

The Yoyogi Stadium was originally built as the venue for swimming (Large Gymnasium) and basketball (Small Gymnasium). Since their opening, the facilities have been used for sports events, not limited to swimming and basketball. Such functional continuity may be seen as part of the authenticity in accordance with the Nara Document.

**(3) Urban core**<sup>18</sup>

Urban core was an important concept for urban design since the 1950 's. Also, Tange participated in the 8th Conference of the Congrès International d'Architecture Moderne (CIAM), held under the theme "The Heart of the City" in Hoddesdon, UK, in 1951, and presented a paper "The Core: Its Social and Historical Background". In the Yoyogi Stadium, he created a space for many people to gather, using the sloping terrain in one of the busiest areas in Tokyo. The Yoyogi Stadium is an exceptional example where the urban core and architecture are incorporated in one

**(4) Modernism and tradition; silhouette and interior views**<sup>19</sup>

A popular approach to combine modern architecture and Japanese tradition in the early 20th century was the so-called "Teikan style", where a Japanese-style roof and a Western-style body were combined.<sup>20</sup> However, Tange was against a conventional interpretation of traditional elements, especially the roof. He created an architectural grammar, while radically reinterpreting the Japanese tradition.<sup>21</sup> The Yoyogi Stadium realised a temple-like architecture with a large roof, using the most modern construction technology of the time. The silhouette of the Yoyogi Stadium is stately. This achievement can be considered an outstanding example of 20th century architectural cityscapes. Besides the impressive silhouette, another characteristic feature is a dynamic and symbolic interior view in the two gymnasiums, created by the triangle-shaped ceiling and top lighting. The suspended structure's two main wires and semi-rigidity are used to create this effect. "It not only solved the issue of releasing the water vapor from the swimming pool, but also evoked a feeling of sublime for the vertical connection between heaven and earth".<sup>22</sup> These features embody Tange's famous phrase: "Only beautiful things are functional".

**(5) Olympic Diploma of Merit**

Pierre de Coubertin, the originator of the modern Olympic Games, created the award in 1905 for those who had rendered outstanding services to sports or who had made a ma-

ior contribution to the promotion of the Olympic ideals. A total of 57 individuals, including athletes and artists, were honoured until the diploma was discontinued in 1974. The IOC granted this award to Tange for his creative design of the Yoyogi Stadium.<sup>23</sup>

**(6) Craftsmanship**

Tange chose the suspension roof structure to create a large space to accommodate 15,000 people. "To build a vast space without even one intervening column, two main cables that were 33 centimeters in diameter and weighed 250 tons were strung between two structural support columns that were 40 meters in height and 126 meters apart. Wire ropes were stretched in a crosswise fashion down the left and right sides, suspending the massive roof."<sup>24</sup> But as soon as the construction work started, the construction company discovered that when "the steel plates used for roofing material were placed on the suspended wires that supported the roof, the weight of the roof caused it to deform itself."<sup>25</sup> Nevertheless, the construction company "succeeded in building the historically unprecedented suspension roof by substituting steel frame for the wires stretched at right angles from the main cables of the structure that was originally planned as an all-wire construction." "A thick rope that was 4.4 centimeters in diameter was used to control the impact of the wind on the painstaking work of installing the roof panels, which each differed in shape." Thus, highly developed craftsmanship enabled to complete the construction of the Stadium only within 18 months.

**The state of conservation of the Yoyogi National Stadium**

On July 11, 1977, Tange sent a letter to relevant authorities claiming that the condition of the Yoyogi Stadium was very worrying, and asking that appropriate measures be taken. In October of the same year, an on-site investigation took place and a report was issued. From 1981 until 2019, three large-scale restoration projects were implemented: the first project from 1981 until 1985; the second from 1992 until 1994; and the third from 2013 until 2017. And from 2017 until 2019, there was a further project to make the Stadium more earthquake-resistant to prepare for the Tokyo 2020 Games.

To inherit and transmit the existing buildings has been the principle of the projects. Hence, throughout these restoration projects, due attention was paid to the exterior and interior design of the Stadium. Even if intervention was necessary, the same approach as that for heritage buildings was applied. Hence, original materials were conserved and reused as much as possible; even when replacement was inevitable, the same design, materials and specifications were applied; when new facilities, for instance those to enable barrier-free access, needed to be installed, consideration was given not to affect the existing design.<sup>26</sup>

While the state of conservation of the two Gymnasiums of the Stadium seems fine, more discussions would be necessary in order to identify an appropriate buffer zone to control development projects in the area and to maintain the visual

integrity. The Stadium is located in one of the busiest areas of Tokyo.

### Abstract

Während der Olympischen Spiele in Tokio im Jahr 2020 werden 42 Einrichtungen/Standorte genutzt. Sieben der 42 Anlagen wurden bereits bei den letzten Olympischen Spielen 1964 genutzt. Die Olympischen Spiele 2020 werden unter dem Thema der Nachhaltigkeit stattfinden; daher ist diese Vorgehensweise zu begrüßen und sollte auch in Zukunft fortgesetzt werden. Zu diesen sieben Einrichtungen/Standorten gehören vier Gebäude, d. h. das neue Nationalstadion, die Tokyo Gymnasium Hall, das Yoyogi-Gymnasium und die Nippon Budokan Hall (drei Standorte sind der Kokyo Gaien-Nationalpark, der Asaka-Schießstand und der Bajikoen-Reiterpark).

Die Tokyo Gymnasium Hall wurde 1990 von Fumihiko Maki weitgehend umgestaltet. Im Jahr 2020 soll das Gebäude für Tischtennis genutzt werden. Die Nippon Budokan Hall,

entworfen von Mamoru Yamada, ist eines der repräsentativen Beispiele der japanischen Moderne. Diese Halle wird im Jahr 2020 für Judo und Karate genutzt werden. Das alte Nationalstadion wurde abgerissen, und das neue Stadion wird an derselben Stelle errichtet. Der Entwurf von Zaha Hadid wurde zunächst ausgewählt, aber dann aufgegeben, und nach einem neuen Wettbewerb wurde der Entwurf von Kengo Kuma ausgewählt. Das Yoyogi-Gymnasium, eines der repräsentativsten Werke von Kenzo Tange, wird im Jahr 2020 für den Handballsport genutzt werden. Die äußeren Umrisse dieser vier Gebäude sind die gleichen wie 1964. Alle wurden sowohl für den Sport als auch für andere Funktionen genutzt.

Dieser Beitrag konzentriert sich jedoch auf die Halle des Yoyogi-Gymnasiums, da man sich vom Standpunkt des architektonischen Wertes, insbesondere vom universellen Standpunkt aus, nähern sollte. Der Aufsatz analysiert die Bedeutung der Yoyogi Gymnasium Hall in Tanges Karriere, die Geschichte der Halle, ihre architektonischen Besonderheiten und einige Managementfragen.

- <sup>1</sup> President of ICOMOS; distinguished professor at Kyushu University, Japan. I express my sincere gratitude to Prof. Dr. Saikaku Toyokawa for his kind support to draft this paper.
- <sup>2</sup> The IOC decided that the Olympic Games in Tokyo will take place in 2021, but the organising committee decided to keep the title “Tokyo 2020”. (<https://tokyo2020.org/en/>) (accessed on May 15, 2020) This article also follows this practice.
- <sup>3</sup> Concerning the history of the Tokyo Metropolitan Gymnasium Hall, including pictures of the old building and the current one, see [https://www.tef.or.jp/tmg/en\\_history.jsp](https://www.tef.or.jp/tmg/en_history.jsp) (accessed on May 15, 2020).
- <sup>4</sup> <https://www.nipponbudokan.or.jp/english> (accessed on May 15, 2020).
- <sup>5</sup> <https://tokyo2020.org/en/venues/olympic-stadium>; see also a video report of the Japan Times at <https://www.youtube.com/watch?v=JasJYHXOUPw> (accessed on May 15, 2020).
- <sup>6</sup> <https://www.youtube.com/watch?v=70yOSr0C-mts&list=PLq02BU9ivnuxQu-y-SsumvqGWp4KEiD2V> (accessed on May 15, 2020).
- <sup>7</sup> The Japan Sport Council, *The Management Plan for Preserving Yoyogi National Stadium as a Living Heritage* (2019), pp. 34–38.
- <sup>8</sup> See no. 16 at the website of DOCOMOMO Japan: <http://www.docomomojapan.com/registration/> (accessed on May 15, 2020).
- <sup>9</sup> See no. 79 at the website of DOCOMOMO Japan: <http://www.docomomojapan.com/registration/> (accessed on May 15, 2020).
- <sup>10</sup> Broadcasting company, newspaper publisher, and other types of offices are in the same building, which can be extended.
- <sup>11</sup> See no. 88 at the website of DOCOMOMO Japan: <http://www.docomomojapan.com/registration/> (accessed on May 15, 2020).
- <sup>12</sup> Mamoru KAWAGUCHI, *The Tange-Tsuboi Collaboration Model in Structural Design: The Case of Yoyogi National Indoor Stadiums*, in: Seng KUAN and Yukio LIPPIT (eds.), *Kenzo Tange – Architecture for the World*, 2012. Lars Mueller, cited in: the Japan Sport Council, *The Management Plan for Preserving Yoyogi National Stadium as a Living Heritage*, 2019, p. 42.
- <sup>13</sup> <https://whc.unesco.org/en/list/870/gallery/&maxrows=42> (accessed on May 15, 2020).
- <sup>14</sup> See its website at <https://cathedral-sekiguchi.jp/> (accessed on May 15, 2020).
- <sup>15</sup> The Japan Sport Council, *The Management Plan for Preserving Yoyogi National Stadium as a Living Heritage*, 2019, p. 38.
- <sup>16</sup> The Japan Sport Council, *The Management Plan for Preserving Yoyogi National Stadium as a Living Heritage*, 2019, p. 66.
- <sup>17</sup> Ibid.
- <sup>18</sup> Ibid.
- <sup>19</sup> Ibid. 66–68.
- <sup>20</sup> A typical example is the main building of the Tokyo National Museum, built in 1931.
- <sup>21</sup> Ibid.
- <sup>22</sup> Ibid.
- <sup>23</sup> John E. FINDLING/Kimberly D. PELLE (eds.), *Encyclopedia of the Modern Olympic Movement*, 2004, p. 172.
- <sup>24</sup> <https://www.shimz.co.jp/en/topics/construction/item01/content01/> (accessed on May 15, 2020).
- <sup>25</sup> Ibid.
- <sup>26</sup> Ibid., p. 61 f.