

The image shows the interior of the Tokyo Bunka Kaikan, a modern theatre building. The space is characterized by its minimalist design, featuring several tall, slender, cylindrical columns that support the ceiling. The ceiling is dark with numerous small, recessed lights, creating a starry effect. Large windows on the upper level allow natural light to filter in. In the foreground, a wide, multi-tiered staircase with a light-colored carpet and a gold handrail leads up. The ground floor is a busy area with people walking and standing, some near informational displays. The overall atmosphere is one of a sophisticated and contemporary architectural space.

Significant Modern Theatres: Tokyo Bunka Kaikan

TD&T discusses the Tokyo Bunka Kaikan in Japan in this issue as part of its multi-year research collaboration with *Bühnentechnische Rundschau*, the journal of the Deutsche Theater-technische Gesellschaft (Germany's Theatre Technical Society) and *Sightline*, the journal of the Association of British Theatre technicians. Under the auspices of this project, noted specialists in theatrical architecture are producing an ongoing series of articles celebrating and re-examining some of the most significant theatres that opened between 1950 and 2010. The project is led by David Staples, theatre consultant. The research informed the International Theatre Engineering and Architecture Conference (ITEAC) held in London in 2018. The articles will be published in a book entitled *Modern Theatres 1950 to 2020*.



The theatre was designed by architect Kunio Maekawa as both a social and artistic space.

Credit??

One of the first significant post-war theatres in Japan, this truly multi-purpose hall required innovative concepts by the architect and design team to achieve success

BY SHOZO MOTOSUGI

Since opening in 1961, the Tokyo Bunka Kaikan (TBK), a concert hall in Ueno Park, Taijo, Tokyo, has become one of the most important and influential music and cultural venues in the reconstruction period after World War II. Tokyo Bunka Kaikan (TBK) was commissioned by the Tokyo Metropolitan Government in response to public demand for a venue to enjoy opera and ballet in Tokyo, and to commemorate the 500th anniversary of the city.

Architect Kunio Maekawa designed TBK as a city square in a large park because he believed that a theatre should be a place open to the public for social interaction, as well as a place to host art and cultural events. A number of TBK's features give expression to this vision, including the sequence of public spaces leading from the lobby to the foyer, while linking to the surrounding environment; the design of the audience space where people can equally enjoy the action on stage and interact with each other; the creation of an auditorium and stage with technical capabilities and acoustic qualities suitable for both concerts and operas; and the arrangement of the stage and the audience seats in a manner that is successful for both performers and the audience.

Kunio Maekawa, who designed TBK, began his career after being shocked by the last "Confession" chapter in Le Corbusier's *The Decorative Art of Today*. He left Tokyo in 1928 on the Trans-Siberian Railroad to visit Corbusier's studio in Paris, where he apprenticed for several years. Avoiding the growing militarism in Japanese society, Maekawa left Japan as soon as he graduated from the university in pursuit of the architecture of humanism under freedom and equality. Corbusier designed the National Museum of Western Art in Tokyo's Ueno Park. Thirty years later his former pupil, Maekawa, designed TBK in the same park.

Maekawa's first design opportunity came from the post-World War II competition held for the design of the

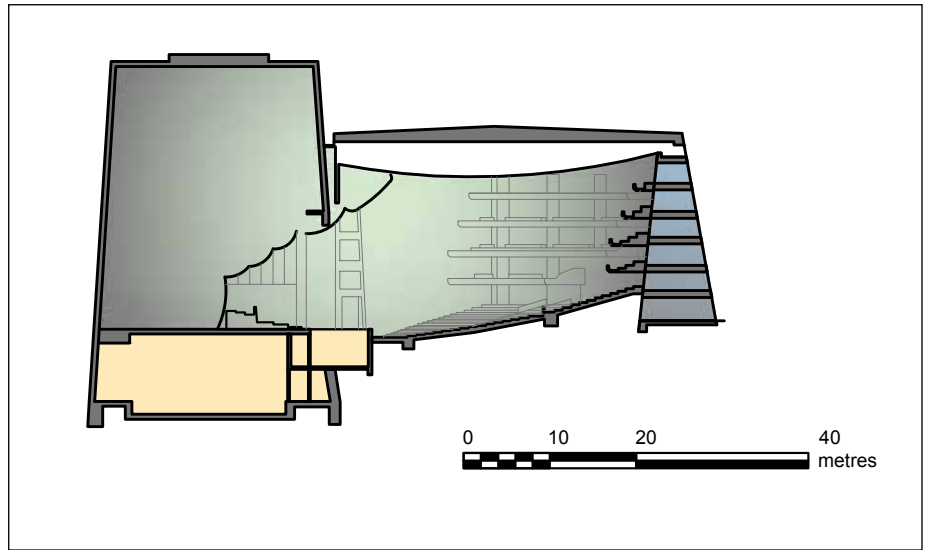
Kanagawa Kenritsu Toshokan/Ongakudo (Kanagawa prefectural library/concert hall), which opened in 1954. The building was commissioned by the prefectural governor of Kanagawa, Iwataro Uchiyama, to memorialize the “Treaty of Peace with Japan” in the same year. Maekawa grasped the potential significance of the new building in supporting the revival of culture saying, “Now is the time to provide people with a place where they can enjoy music calmly to give themselves strength towards tomorrow.” He was selected from five named architects, including Kenzo Tange.

The building lies halfway up a hill commanding Yokohama port. It has a quiet appearance that gently welcomes people and does not show the grandiose posture so typical of cultural facilities. For the periphery of the library, perforated blocks are used to control light like louvers. Such blocks are continuous at the handrails of the terrace on the second floor of the concert hall. The materials and structures are all simple, including the above blocks.

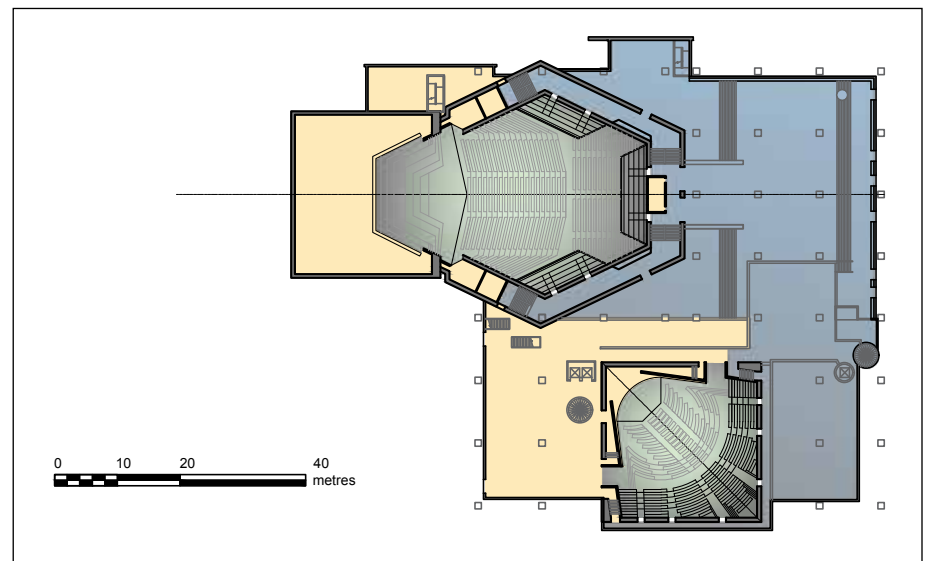
Maekawa’s work on this project was so well received that it led to his appointment to design TBK. The construction of TBK took place under the political wave caused by ratification of U.S.-Japan Security Treaty (1960), the signing of which caused mass demonstrations in Japan. Both projects are symbolic of Japan’s post-war recovery.

Nonetheless, the appearance of TBK looks the opposite of the quieter style of Kanagawa prefectural concert hall. The size itself is huge, and the stretch of land in front of the building is also different. Compared with the Kanagawa hall, which has a plain facade made with glass windows and walls and simply presents the necessary functional volume, TBK has a stronger and massive expression, being rather exaggerated or boorish, with its large upswept pent-roof, a lot of heavy vertical pillars, and exterior wall panels inlaid with crushed marble.

And yet, there are common concepts visible in both buildings. For example, the pent-roof (balcony) emphasizes its horizontal character, with the open-ceiling space or high pillars arranged on the periphery conversely highlighting the vertical nature. Huge glass surfaces extend from the floor to the ceiling in the foyer, with the ceramic industrial



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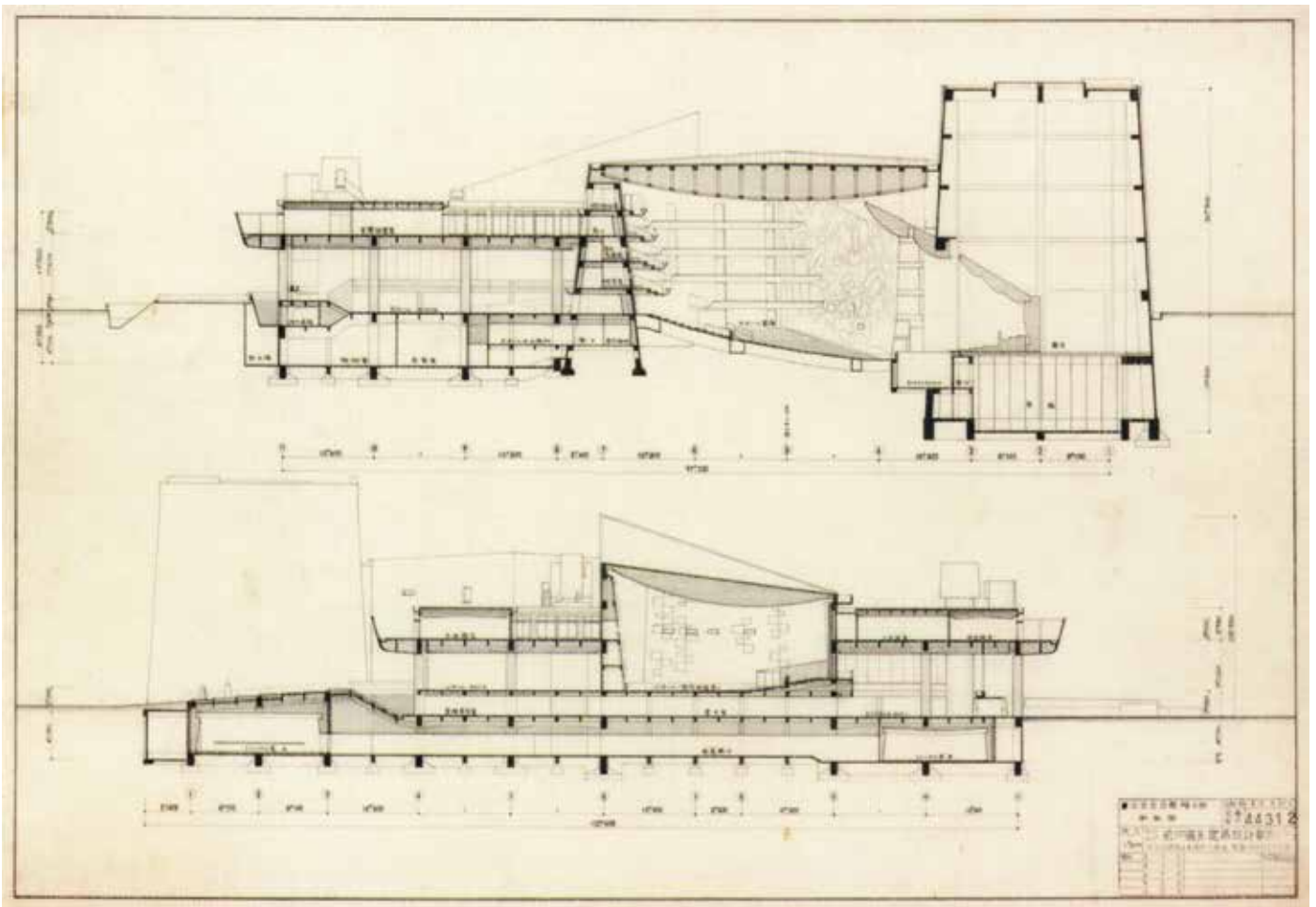
materials found in the perforated blocks and the wall panels with crushed marble. So, while having different appearances, these buildings share the same architectural root.

Compared to many European and American theatres and concert halls, TBK is compromised spatially and technically. The depth of the main stage is restricted by the sound reflectors, and the ceiling of the side stage is low due to the foyer garden of the small hall. There are too few fly bars, and they are not correctly located because the sound reflectors interfere. Moreover, their loading capacity is limited. Even with such inconveniences, TBK was the best facility of the time in Japan. Because of these poor complications, new concepts and ideas were

sought in subsequent Japanese halls. TBK influenced future performing arts buildings in these and other ways.

In particular, Tokyo Bunka Kaikan became a significant venue for performances in Japan after the war, and it served as a window to the world. The name is well known to the many world-famous opera companies and orchestras who visited from London, New York, Vienna, Munich, and Milan. An amazing number of people—artistic directors and stage engineers, as well as the conductors, players, and singers of classical music and ballet dancers—from outside Japan have stood on the stage and provided Japanese audiences with their wonderful performances.

The performances by foreign



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companies spurred the growth and development of musical life in the city. Musicians, theatre people, and even audiences matured and developed. Of course, such growth was realized not solely by TBK. It was boosted by cultural exchange programs with Western countries conducted at public halls, commercial theatres, etc., throughout Japan at various levels. The construction of so-called Japanese-style multi-purpose auditoriums, where various programs including operas, ballet, concerts, and dramas are performed, spread quickly after this period.

Presenting Theatre as a Square

The external appearance of Tokyo Bunka Kaikan is characterised by its large up-swept pent-roof whose height is aligned with the roof of the National Museum of Western Art (1959, designed by Le Corbusier), which faces TBK across the way; the height of the Museum dictated the height of TBK. The layout patterns of sashes are also matched with the

pavement pattern in the front garden of the museum. The two buildings are like brothers, because the exterior wall of the museum is finished using the precast concrete slabs with boulders, while the precast concrete slab with crushed marble is used for the exterior walls of TBK.

On the initial plans, the large hall of TBK and the museum were not directly across from each because a larger building site was originally proposed. Originally, the buildings were planned to face each other at an angle with a rather wide square in between. This would have placed the stage along the main traffic line toward the Ueno Park, a reverse positioning compared to the completed scheme. Although the intention to expose the large wall surface of the fly tower along the main traffic line toward the park was not achieved, the idea of locating the stage at ground level and leading the audience to the second floor is rational from the viewpoint of theatre functionality.

The site footprint was reduced to

almost half, requiring drastic changes to the initial concepts. As a result, new ideas were proposed, including where the stage and the related spaces such as dressing rooms and rehearsal rooms are arranged in the basement, while other facilities like meeting rooms are in the upper part of the foyer. These ideas allowed the entrance lobby and the foyer of the large hall to be created at the place that used to be the outside square. To hide the rooms on the upper part of the foyer, the large upswept pent-roof was created.

Planning restrictions also limited the building height in a sensitive park and the volume above ground had to be minimized to reduce the impact on the green environment. This resulted in the stage being lowered to the first basement level, which compromised the load-in access but allowed good audience entrances and exits. It was fortunate that the theatre was regarded as a place where people would gather, an open space where the flow of people to the space is spontaneous.



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We can see the intention of the architect that the entrance lobby and foyer should be indoor squares or public places in the city flowing into the park. The architect wanted to create a square where anyone can enjoy music and drama. The floor of the entrance to the foyer of the large hall is inlaid with tiles, which have triangle patterns in different colors and look as if studded fallen leaves. On the dark blue ceiling, lights are arranged randomly, like the Milky Way. Moreover, the main entrance near Ueno station and the facade on the opposite side have a similar large glass surface and doorway, respectively, so people can pass through the building. To access the small hall, on the other hand, people walk up a gentle slope from the entrance hall to the foyer on the second floor. There, visitors find the outside garden linking to Ueno Park.

The auditorium wall facing the large-hall foyer is formed with pre-cast slabs inlaid with crushed marble, which continue to the exterior walls that are finished in the same manner. The spectators enter

through a passageway created between this wall and a second inner wall to reach their seats. Along the passageway, windows are set here and there. The visitors can look out of the window into the foyer of the large hall, the slope to the small hall, etc. Audience members seated on the upper levels in the large hall can exit to a roof garden during an interval. The auditorium is characterized by its hexagonal form, the shallow stacked balconies, the side walls that slope inwards, the convex curve of the ceiling shaped to improve the acoustics, and the wooden diffusing panels on the side walls.

Maekawa loved music and often went to the opera and concerts during his time in Paris while working at Corbusier's office. Before designing the Kanagawa Prefectural Concert Hall, he visited and investigated the Royal Festival Hall (1951, London), which had the latest design at that time. As an architect who promoted the modern architecture of humanism, he had to infuse the principle of a modern theatre in which everyone can

enjoy music and drama equally with fine sight-lines from any seat by also removing the decorations and box seats from the horseshoe-shaped opera houses typical of the 19th century.

At the time TBK was designed, auditorium layouts worldwide were moving away from the historic galleried, multi-level rooms. This was partly influenced by Wagner's Bayreuth Festspielhaus, which accommodates the entire audience on one very large main floor. In many countries, too, these designs were inspired by a move away from the apparent elitism of multi-level galleried theatres to seemingly more democratic spaces with only one or two seating levels. This resulted in large, impersonal auditoriums lacking warmth and intimacy. Moving balcony rows forward to give better sightlines would create considerable depth and place a significant number of audience members under the balcony, where poor acoustic conditions would result from the deep overhang. The distance to the stage would also be longer.

Maekawa developed the concept of the auditorium with seats spread in a fan shape at the rear sides of the lower level and stacking a series of narrow balconies above. The balcony seats are on the three sides, facing the stage and down the side walls. They are shifted by half a floor-level so that the gaps between the balconies are tightened to fill out the entire wall surfaces with the seats. In this way, the total of 2,340 seats are stacked in a tight footprint.

The side and rear walls of the auditorium are inclined outward by 6.5 degrees to improve the sharp downward line of sight from the audience to the stage and reduce the difference in levels between the seats. Owing to these ingenious arrangements, the maximum distance of a seat from the stage is kept within 38 meters even with more than 2,300 seats, and good sightlines are provided. It also helps for the performers on the stage to feel as if they were embraced by the audience. The balcony fronts, then, have a curved face. The shape was designed to optimize the acoustics of the auditorium, but also to reinforce the significance of the room as a public place where people meet. The interior shapes also suggest the shape of the big eaves on the periphery of the building.

Acoustical Innovations

A major design issue was acoustics so an acoustical design team was involved from the earliest conceptual design phase. The team was from NHK Science & Technology Research, and the contract was directly with the client.

The site is close to a railway station, which is convenient for visitors, but vibration and the noise of whistles from freight cars using Ueno station was a challenge. The team measured the levels of noise and vibration to obtain data to identify and solve this problem. A first step was to locate the stage of the large hall as far from the railway track as possible. This resulted in the small hall, originally conceived as a conference hall, being located close to the railway track. To reduce vibration, it was lifted to the second-floor level and the sound insulation of the surrounding windows and walls was enhanced.

Repeated sound measurements led to design and construction solutions to minimize the disturbing effects of noise and vibration carried through the air and



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ground from the railway track. Floating isolating layers were conceived and arranged on the sidewalls of the stage and the roof of the audience seats. Noise and vibration from the heating, ventilation, and air conditioning systems was reduced by mounting fans and pumps and using silencers and other measures on the ducts and chambers to reduce airborne noise to achieve a Noise Criterion rating of NC-20.

Detailed acoustic knowledge was limited, and the design process was iterative for this early post-war building. The only acoustic information available was the experimental results of Haas related to the reflected sound up to 50 milliseconds, which was obtained from literature. Considerable effort went into tracking reflected sound based on the hexagonal plan, sloped walls, and the shaped balconies. The goal was to identify the optimum routes by which sound from the stage could be reflected and delivered to each spectator equally, and what kinds of room shape and finishing are required to optimize the room acoustics.

The shape of the downward ballooned ceiling of the auditorium was generated through the above process. It was designed to play an important role in delivering the early reflected sound effectively to the entire audience. The ballooned part was made with 50-millimeter thick lightweight cast in situ concrete. It is believed that this structure has

contributed to “the warm tone” of the hall.

Diffusers or sound-absorbing surfaces are attached to the walls to affect reflected sounds of 50 milliseconds or higher. The sculpture-like wooden acoustic diffusers attached on the side walls of the auditorium close to the stage and the big white curved ceiling over the orchestra pit are typical examples. It is said that TBK was one of the first halls to adopt the irregular widths and spacing of ribs used on the sound-absorbing surfaces.

The experience and acoustic experiments in designing and building TBK caused a great step forward in acoustical design in the country and were used in the acoustical design of subsequent multi-purpose halls in Japan. Minoru Nagata, the founder of Nagata Acoustic Inc. and now one of the most acclaimed acoustic consultants, was a member of the TBK acoustical design team. His three key expressions “silence, good sound, and good tone” are based on the experience he gained in this team.

Effectively Multi-Purpose

A multi-purpose hall at that time was inevitably a compromise that could not fully satisfy either those who wanted to present symphony concerts or the needs of opera/ballet performances. Maekawa and his design team decided to focus on theatre, opera, and ballet uses and to introduce sound reflectors above and

around the stage to modify the acoustics for unamplified music, symphony, and other classical music. To ensure the best acoustic performance, however, the sound reflectors need to be heavy to properly reflect frequencies in as wide a range as possible from low to high-pitched sounds. These heavy reflectors and other devices had to be easy to deploy and remove. The orchestra pit is on an elevator that can be raised to stage level for concerts extending the stage/platform forward into the room for music performances. Sound reflectors are hung overhead in the fly tower above the stage. A series of panels behind the musicians are stored in the rear stage area while the side acoustic reflectors are lowered below the stage into the trap room area.

The need for many heavy acoustic reflectors frequently clashes with the need for an unobstructed fly tower and stage for theatrical performances. At TBK the reflectors were originally stored in the three ways described but in 1998 the reflectors were redesigned to be stored

under the stage, and the stage rigging system was completely renewed.

Issues regarding sound reflectors vs. stage rigging that are found in multi-purpose halls have continued to challenge architects and design teams not only in Japan but elsewhere. In a sense, however, the theatre engineering unique to Japan was developed to manage these challenges. How best to arrange and store sound reflectors has been studied and developed following the plans for TBK, and these days, many varied options are available.

Tokyo Bunka Kaikan has been presenting domestic and foreign opera, ballet, and orchestra performances for more than 50 years. At the time it was designed and constructed, there was limited experience or knowledge of such buildings and the architect and design team had to pursue innovative ideas to achieve a successful building. Although there are inevitably compromises, TBK remains a significant performing arts building for Tokyo and Japan.

TBK has contributed to the design

and planning of subsequent buildings planned by both private companies and local governments, including Suntory Hall (1986) and New National Theatre, Tokyo (1997). From the viewpoint of the theatrical construction, the hall was valuable as a building to be imitated with concepts that were developed and improved in subsequent buildings.



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