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12. West Pagoda at Yakushiji, Nara

Owner: Yakushiji
Architect: Kiyoshi Asano
Structural Engineer: Kiyoshi Kaneta
Contractor: Ikeda Construction Co. Ltd.
Chief Carpenter: Tsunekazu Nishioka
Construction Period: October 1977 to March 1981

General Description

Yakushiji was one of the most important temples first founded in the 7th century by the Emperor. At the beginning of the 8th century, when the capital was relocated in Nara, many large temples including Yakushiji were moved there. The new site occupied about 400 m² in what is now West Nara, but the main buildings were erected within an area of 200 m². The central buildings included a main hall and two pagodas. They were surrounded by a semi-enclosed corridor with a middle gate at the front and a lecture hall placed in the rear. The dining hall was behind the lecture hall and to its left and right were large and small L-shaped priests' quarters. Beyond the middle gate was the main south gate, the entrance to the entire temple site. The pagodas were three-storeyed with a pent roof enclosure added to each storey. The main hall was also surrounded by a pent roof enclosure on both storeys. Although the lecture hall was also two-storeyed, it had a pent roof enclosure only on the lower storey.

When Yakushiji was built, about a century had passed since Japanese carpenters first learned the art of temple building from a Korean carpenter. Japan flourished with close diplomatic ties with China during the 7th and 8th centuries. The Imperial Court had succeeded in centralizing administrative and financial powers. Thus they constructed the Nara capital (21 hectares), the palace (ca. 1 km²), and many large temples and aristocratic residences. The Ministry of Construction was founded and building arts progressed rapidly. Special offices for erecting the palace, Yakushiji and other temples were created. In this way, Japanese traditional architecture was established and has continued until today. In the 13th century Japan again took over some more advanced architectural techniques from China, but they were basically only improvements on old methods.

Changes at Yakushiji through the Centuries

The history of Yakushiji records a great fire in 973 that started near the dining hall. Almost all buildings were destroyed but miraculously the main hall and two pagodas in the sacred precinct were spared. Reconstruction was completed before 1015. In 1096, an earthquake demolished the semi-enclosed corridor, and in 1361, another one caused the upper storey of the main hall to lean, the spire on one of the pagodas to fall off and the pagoda itself to bend; both the middle gate and semi-enclosed corridor collapsed. In 1445, a typhoon destroyed the main hall and the main south gate. Finally, in the Battle of 1528, almost every building except the east pagoda was burned down. This was the period of feudal wars when everywhere many temples were razed.

There was no possibility of restoration. After peace was restored in the 17th century, a temporary main hall was erected on the original site where it remained until recently, when it was rebuilt according to the ancient form. The lecture hall was rebuilt in 1852; the east pagoda having been designated a national monument, was repaired in 1898. After the restoration of the main hall was completed, work to erect the west pagoda was started in 1977.

Many earthquakes and typhoons have tested the stability of pagodas. In many cases they have been able to withstand heavy vibration.

The Purpose of the Pagoda

The original purpose of the pagoda was to worship the Buddha's bones. On the foundation stone of the central pillar is a small hole about one foot in diameter. There the relics were enshrined first in an agate bottle contained in a gold vessel. These were placed in one of silver and finally all three were encased in a copper vessel. Gaps were filled with jewels and cinnabar. The hole was covered by a thick stone lid. The central pillar was set into the foundation stone to a depth of about 10 cm. Thus the central pillar especially the metal spire that enclosed the part of the pillar that extended above the roof, symbolized the Buddha's relics. Originally, the spire was gilded and the three-storeyed body was really like a pedestal for the spire. Therefore, the pagoda had to be beautiful because the precious relics were enshrined within. For symmetrical reasons two pagodas were built. However, the relics were set only in the west pagoda.

Construction of the West Pagoda

Unlike the main hall, this pagoda could be restored by imitating the east pagoda. In reconstructing the main hall, the only reference was the excavated foundation and a very short descriptive record. But in regard to the west pagoda, it was necessary to examine and survey the east pagoda minutely. This took about 18 months. At the same time, some parts were restored to their original forms. No new construction methods were adopted; the old construction was faithfully followed. Cypress was imported from Formosa. The soil around Yakushiji is very soft because the area was once marsh land. Therefore, the east pagoda had suffered unequal settlement of more than 13 cm even in the pent roof enclosure. During the 1898 repairworks, the foundation was not touched. Now, four reinforced concrete piles, 1.1 m in diameter and 12 m in length were driven in. An underground steel skeleton enclosed with reinforced concrete was set on them.

The central pillar of the pagoda stands independently without being connected to other timbers because around it are innumerable members supported on piles which would inevitably settle. Connecting these members to the central pillar would cause high stresses. The drawings indicate the construction of the west pagoda.



Fig. 1 General view of the west pagoda

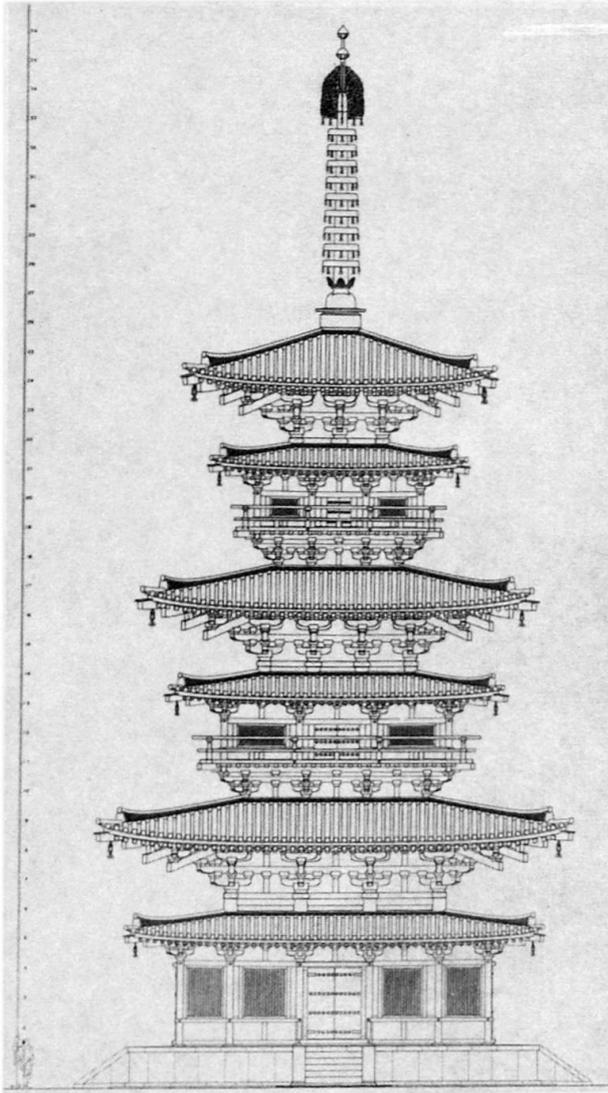


Fig. 2 Elevation

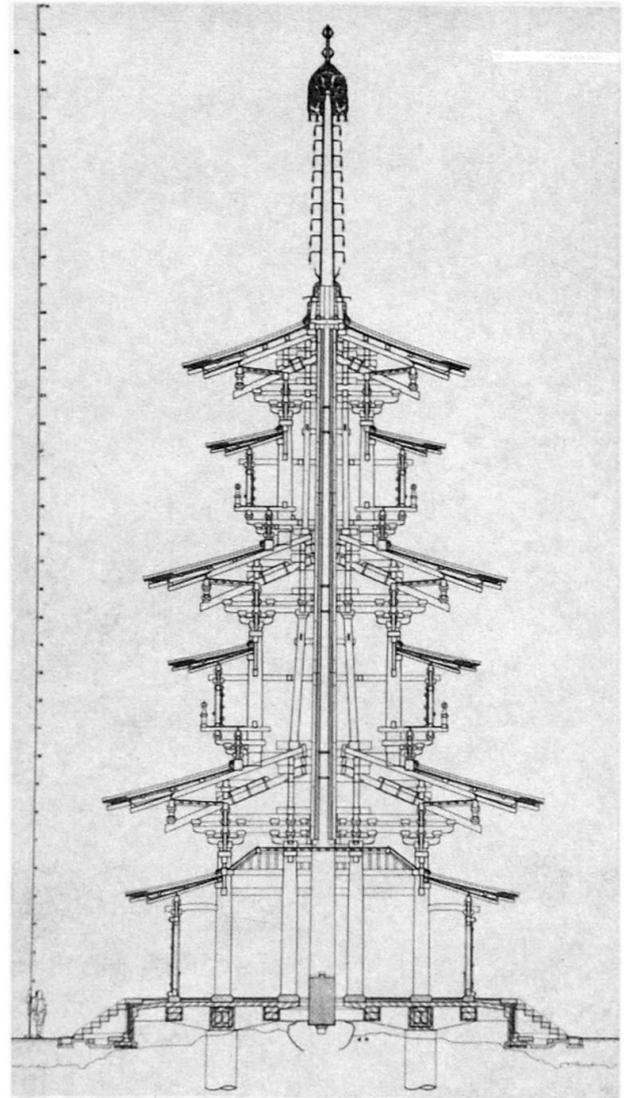


Fig. 3 Section

Twelve main pillars stand on the exterior and four pillars on the interior. Bracket complexes are set on the pillars to support deep eaves. Tail rafters beneath the common rafters are supported at the second step of the bracket complexes and act as levers to support the eaves. They are balanced by the heavy load from the upper parts. Common rafters which extend deeply also act on the lever principle. The upper pillars are erected on sills that are set on the inner sides. Thus, the members are supported on piles up to the top where the spire presses down on the tops of the common rafters. Bracket members are stacked up by inserting separate blocks about one foot long attached to the lower member by dowels, and they grip the upper members.

These pagodas can withstand earthquakes and typhoon winds for four reasons: firstly, because of their big pillars; secondly, because of the quantity of timbers; thirdly, because of the abundant friction between timbers allowing the energy of vibration to be absorbed; and finally, the whole is a very flexible structure.

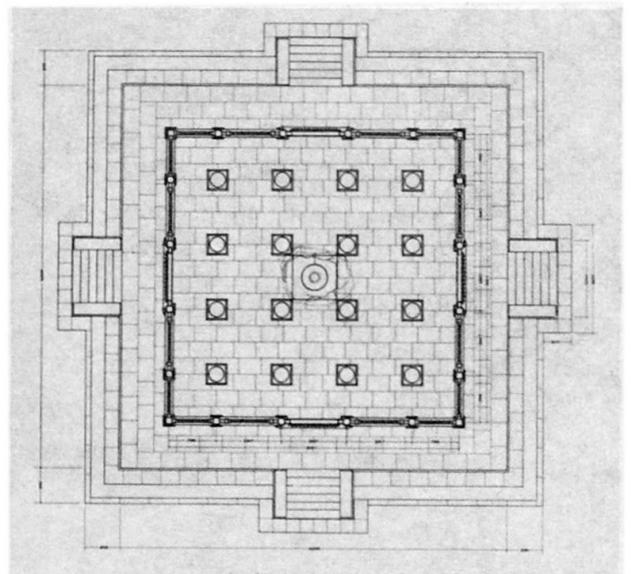


Fig. 4 Plan

(K. Asano)