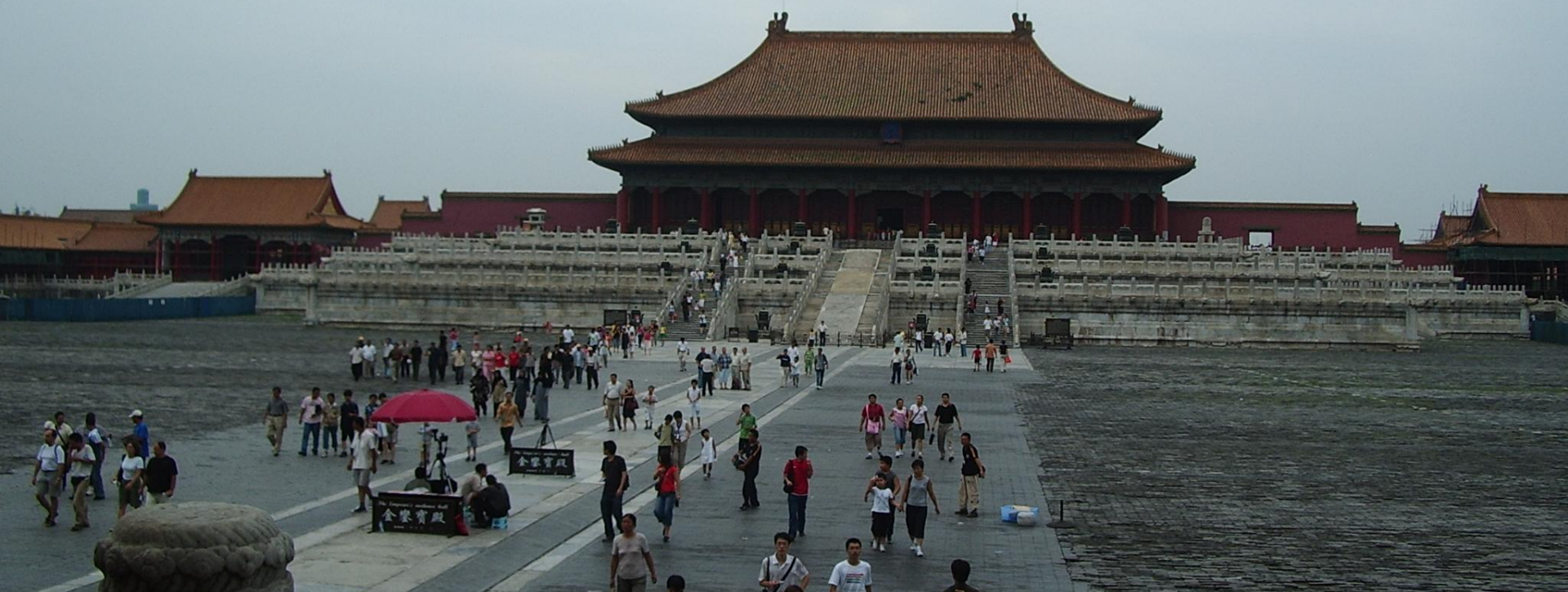




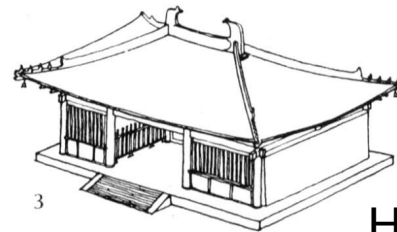
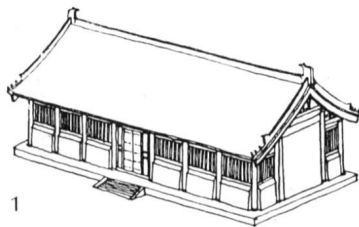
# **Chinese Architecture: DOU GONG Roofs and Bracketing**

Elika Etemad, Juan Rosario, Kimberly Tanz, Ronaldo DeLuna

Forbidden City, Beijing

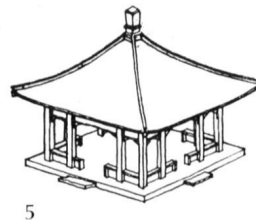
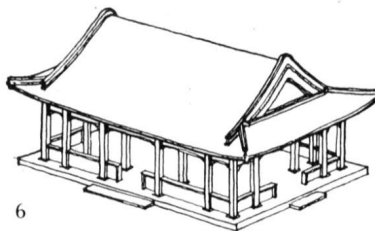
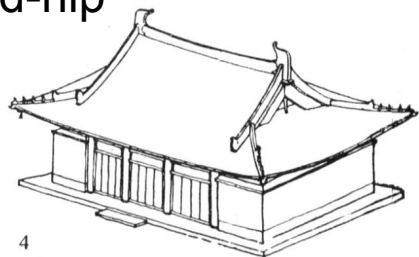


# Gabled

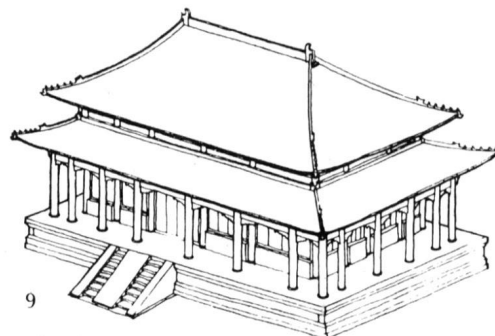
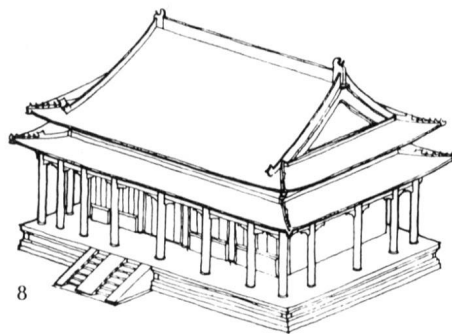
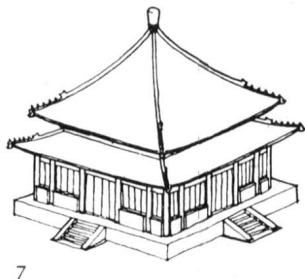


# Hip

# Gabled-hip



# Pyramid





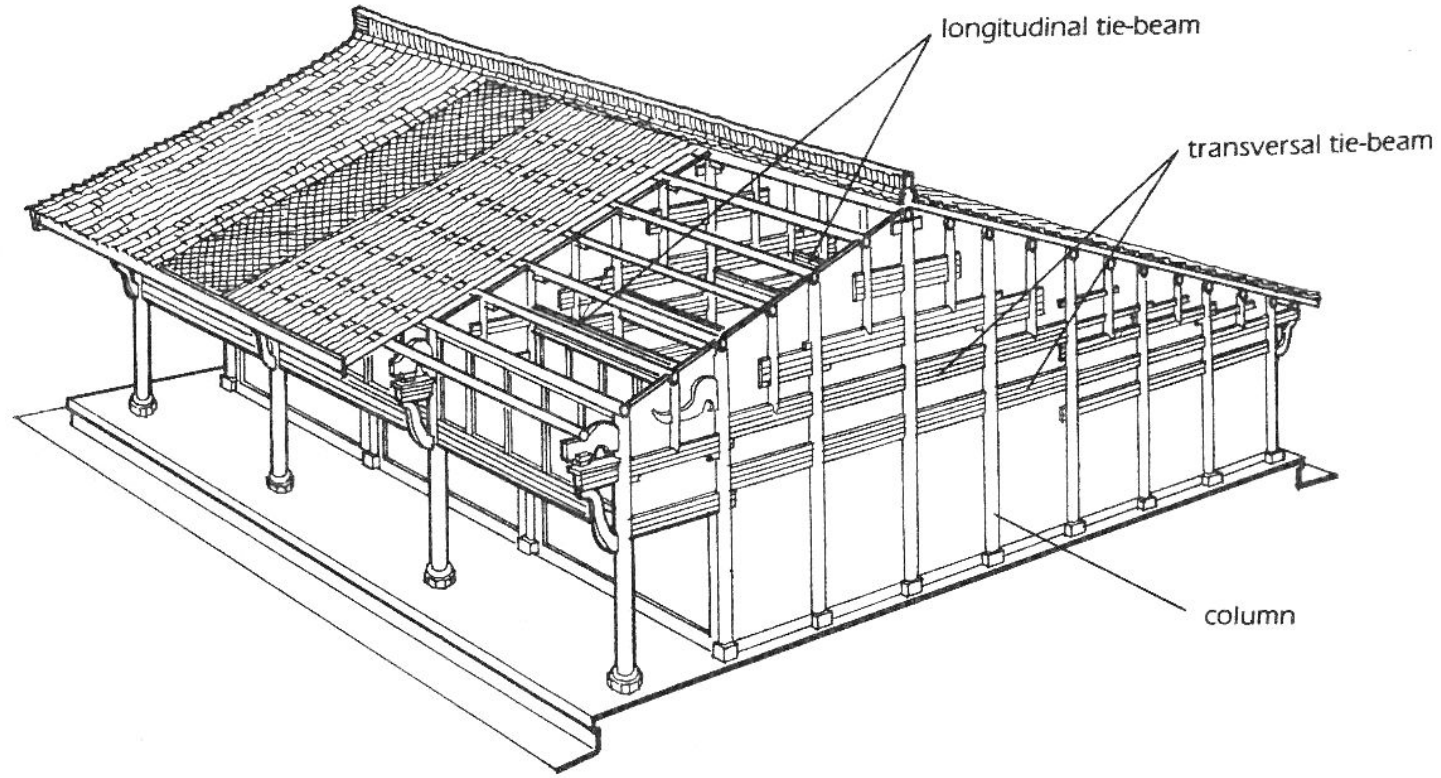
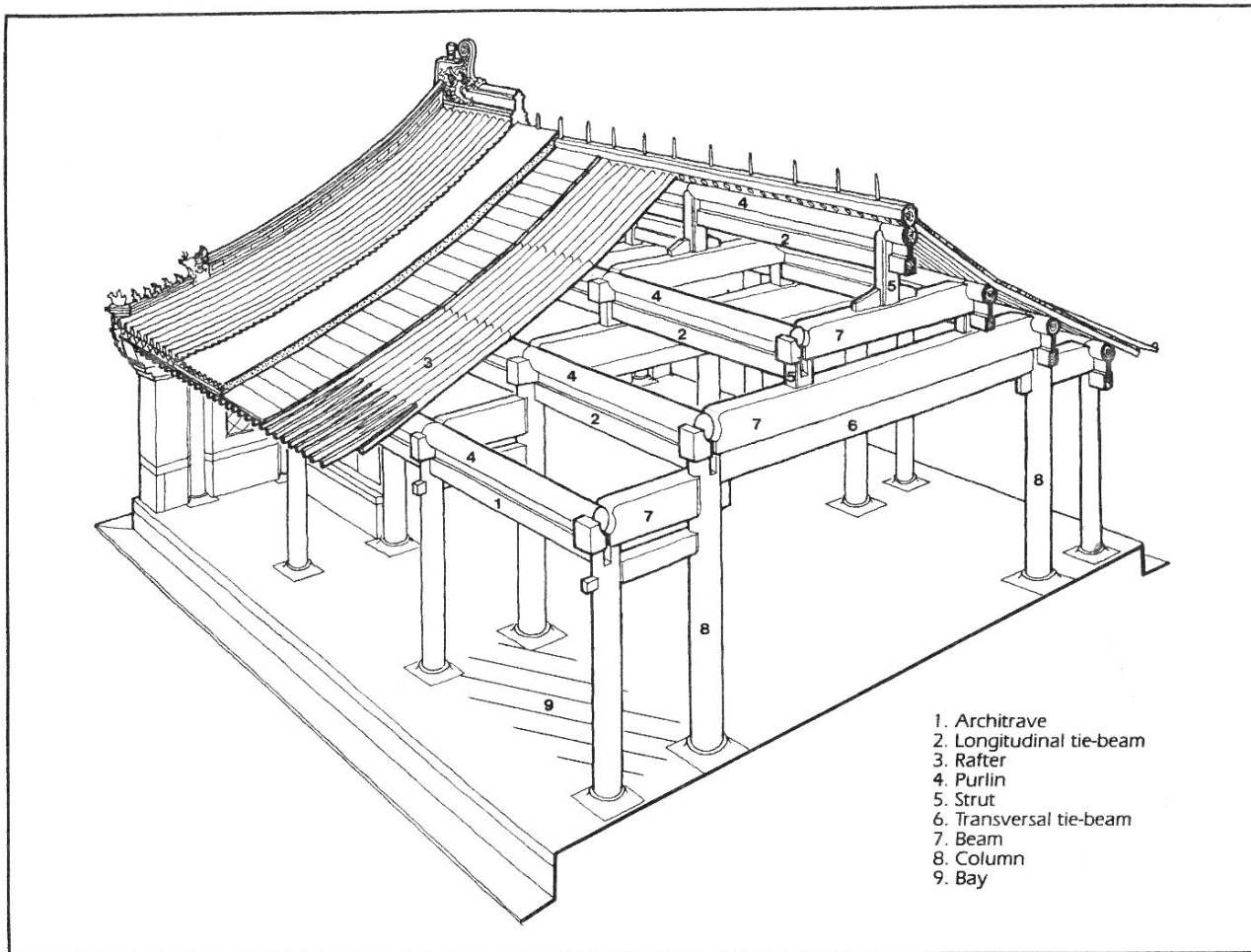


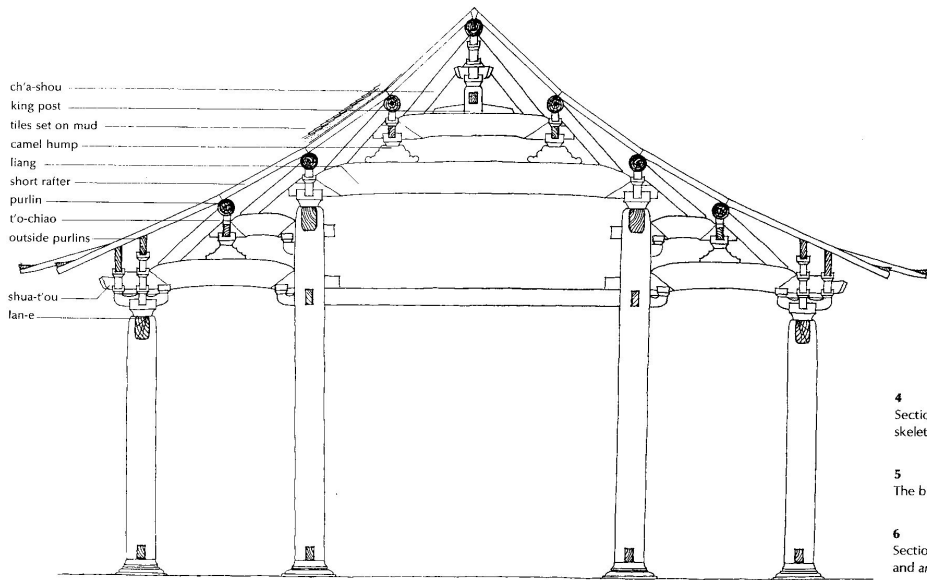
Plate 1.2 Chuandou, or column-and-tie system.



1. Architrave
2. Longitudinal tie-beam
3. Rafter
4. Purlin
5. Strut
6. Transversal tie-beam
7. Beam
8. Column
9. Bay

Plate 1.1 Taijiang, or column-beam-and-strut system.

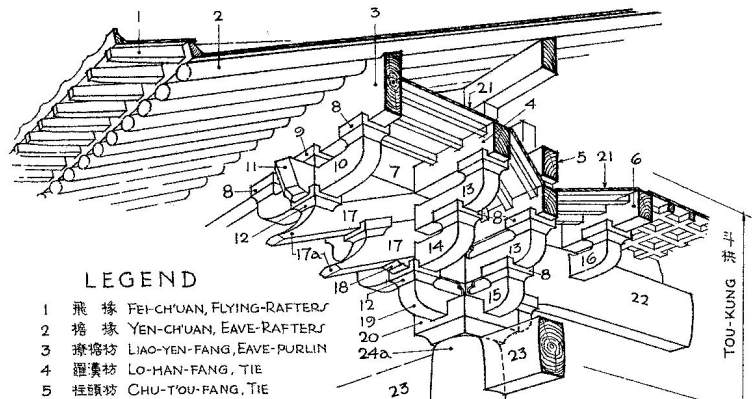
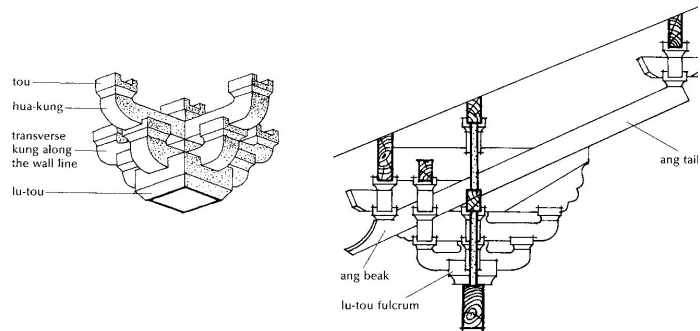




4 Section, showing flexible skeleton supporting curved

5 The basic bracket set

6 Section, showing bracket set and ang



LEGEND

- 1 飛 椽 FEI-CH'UAN, FLYING-RAFTERS
- 2 檐 椽 YEN-CH'UAN, EAVE-RAFTERS
- 3 撩 檐 枋 LIAO-YEN-FANG, EAVE-PURLIN
- 4 羅 漢 枋 LO-HAN-FANG, TIE
- 5 柱 頭 枋 CHU-T'OU-FANG, TIE
- 6 井 口 枋 CHING-K'OU-FANG, TIE
- 7 襯 枋 頭 CH'EN-FANG-T'OU
- 8 殿 斗 SHAN-TOU
- 9 簪 心 斗 CH'I-SIN-TOU
- 10 令 拱 LING-KUNG
- 11 耍 頭 SHUA-T'OU
- 12 交 互 斗 CHIAO-HU-TOU
- 13 樓 拱 MAN-KUNG
- 14 瓜 子 拱 KUA-TZÜ-KUNG
- 15 泥 道 拱 NI-TAO-KUNG
- 16 騎 拱 拱 CH'I-FU-KUNG
- 17 昂 ANG
- 17a 昂 嘴 BEAK OF THE ANG
- 18 華 頭 子 HUA-T'OU-TZÜ
- 19 華 拱 HUA-KUNG, 抄 CH'AO
- 20 欂 栌 LU-TOU
- 21 返 榜 版 CH'EH-CH'UAN-PAN, RAFTER-HIDING
- 22 擔 拱 BEAM
- 23 闌 額 LINTEL OR ARCHITRAVE
- 24 柱 COLUMN
- 24a 柱 頭 TOP OF COLUMN
- 25 攢 CHIH
- 26 柱 礎 BASE
- 26a 盒 唇 P'EN-CH'UN OR LIP
- 26b 覆 盆 FU-P'EN OR PAN
- 26c 礎 PLINTH

斗拱及全建築之各部均均材(如高中5, 13, 17等)或其分數或倍數為比例之度量單位。自虛斗出華拱或昂一層謂之一跳, 斗拱出跳之數可自一跳至五跳不等, 本圖以三跳(層枋以下昂)為例。

THE PROPORTION OF EACH & ALL PARTS OF A BUILDING IS MEASURED IN TERMS OF THE T'AI' (5, 13, 17, ETC.), ITS MULTIPLES & FRACTION. EACH TIER OF CANTILEVER ARM, EITHER A HUA-KUNG (19) OR AN ANG (17), IS CALLED A T'IAO. A SET OF T'OU-KUNG MAY BE MADE UP OF FROM 1 TO 5 T'IAOS. THE EXAMPLE HERE GIVEN IS ONE WITH 3 T'IAOS - 1 HUA-KUNG & 2 ANG.



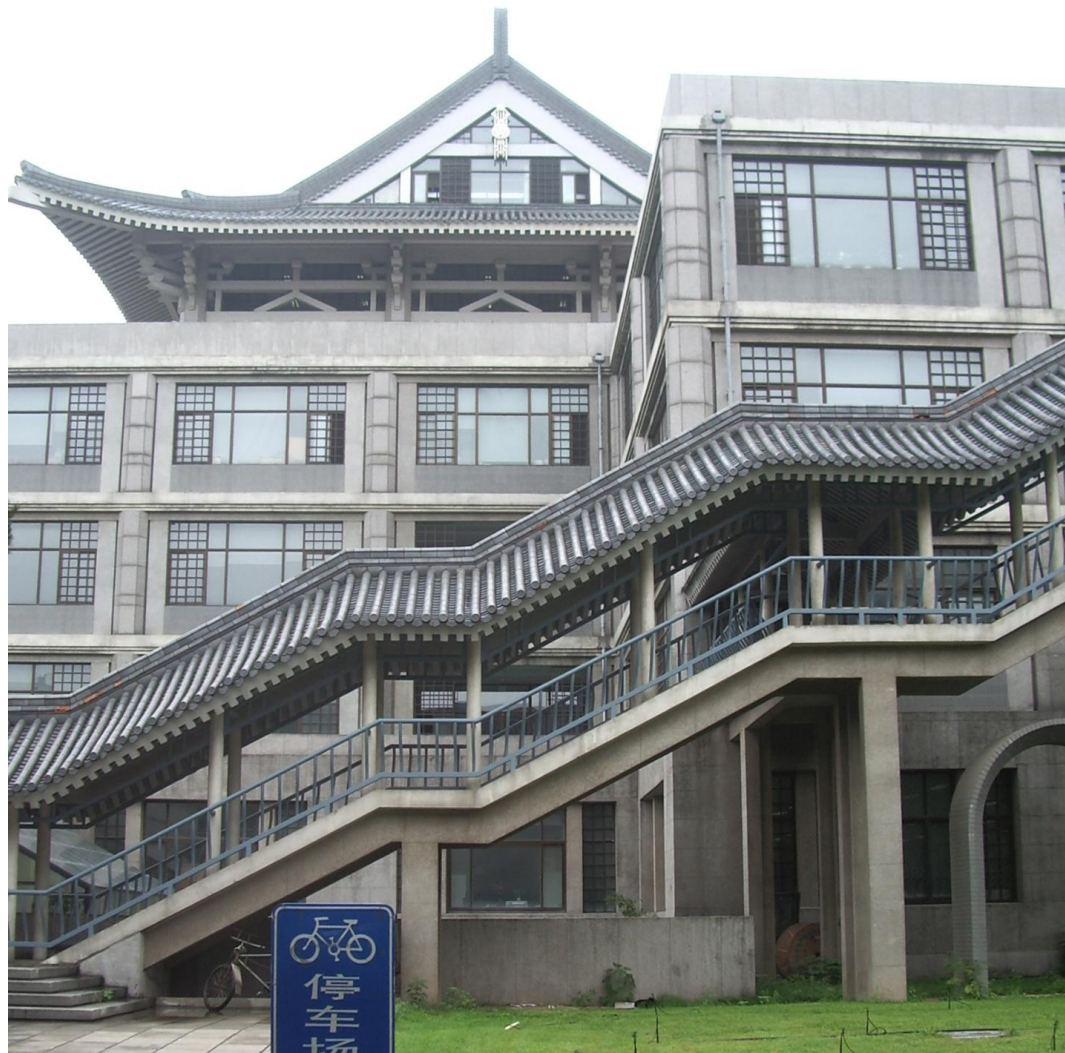














北京大學圖書館

# Chinese Pagodas - Overview

Religious structures - Buddhism

Design inspired by northern Indian stupas and Chinese military watchtowers

Praised for spectacular views

Multi-storied, layered roofs

Original purpose: hold Buddhist relics and sacred writings





# Sakyamuni Pagoda at Fogong Monastery

“The first pagoda”

Diameter 30.27m (99ft)

Height 67.31 m (220ft)

Location: Shanxi Province, Yingxian County

Built in 1056 by Emperor Daozong of Liao (Liao Dynasty)

Main composition: Wood

Oldest surviving pagoda; one of tallest wooden structures in the world



# Sakyamuni Pagoda at Fogong Monastery

“The first pagoda”

Five octagonal levels, ten structural tiers; alternating posts with cantilevered roofs/balconies

4 hidden interior levels, total of 9 stories

Indicated from the exterior by the terrace balconies

Intricately bracketed roofs

54 different bracket arms



# Sakyamuni Pagoda at Fogong Monastery

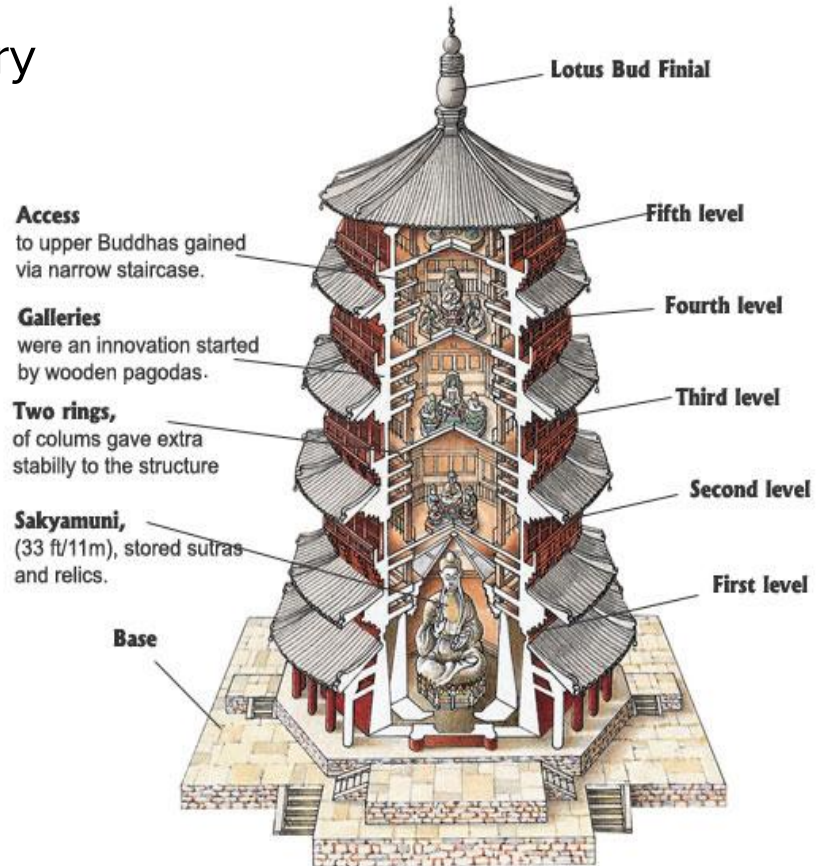
“The first pagoda”

Interior and exterior support columns

Structure tapers to the center; contributes to stability

Buddha statue sits on center of first floor

Ornate caissons on each ceiling



# Pagoda Applications of Chinese Principles

Use of Dou Gong bracketing for structure:



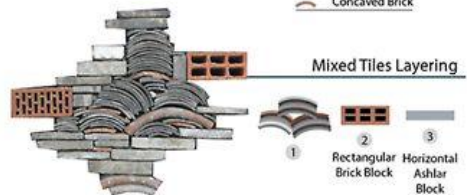
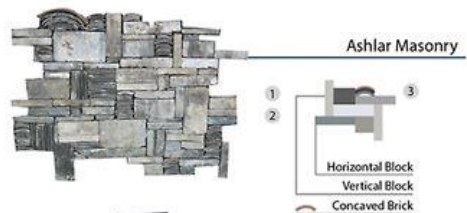
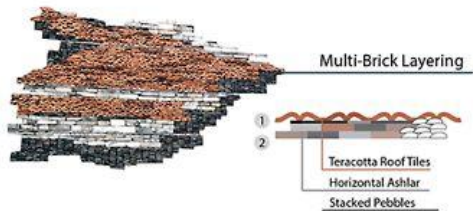
Brackets connect roofs, floors and the columns of the following level resulting in a multi-tiered structure

# Ningbo Historic Museum

- Opened on December 5th 2008
- extensive use of building materials in the old brick, but also the use of bamboo and other elements
- Features of traditional Jiangnan residences are integrated into the museum design
- Mountain and Boat shape



# Tile Facade



## Origin

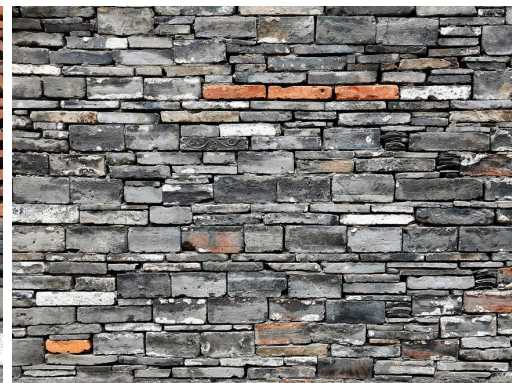


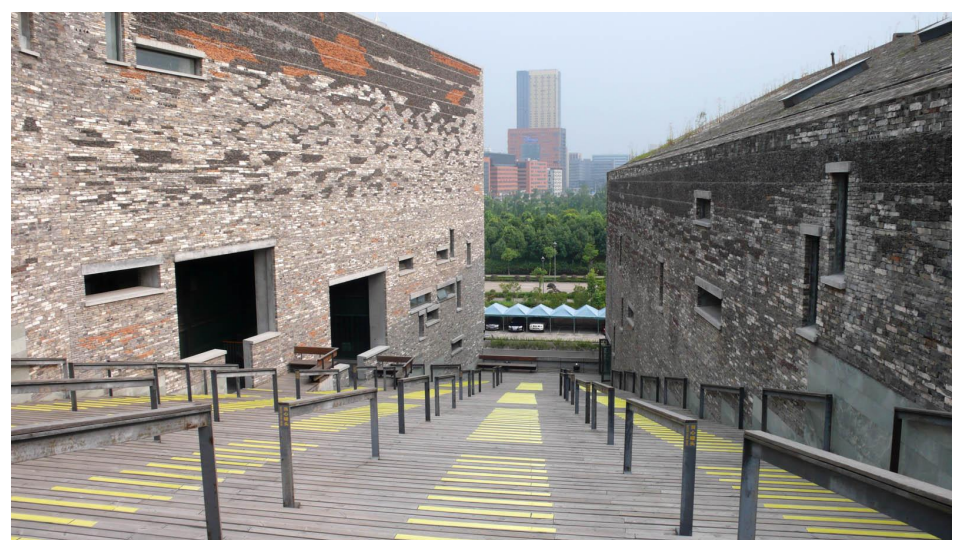
Wa Pan

A local technique involving the use of material fragments...

ie) Ceramic Bricks / Tiles

...assembled together for fast reconstruction after a typhoon.





Guang








































FUNCTION	FOOD									
NAME OF VESSEL TYPE	ding	fang ding	li	xian or yan	gui	yu	dou	fu	jue	
STAGE OF DEVELOPMENT										
POTTERY PROTOTYPE										
EARLY SHANG										
LATE SHANG										
EARLY ZHOU										
LATE ZHOU										

Fig. 1 Development of bronze vessel types. Drawing by Phyllis Ward