

カンボジア・アンコール・タネイ寺院遺跡東門の修復 Restoration Work of the East Gate of Ta Nei Temple, Angkor, Cambodia



Ta Nei Temple and its East Gate

タネイ寺院は、東バライ(古代貯水池跡)の西土手北端部に東面して建つ仏教寺院遺跡で、その建築形式や装飾から、12世紀末から13世紀初頭のジャヤヴァルマン7世王の治世下に建立されたと考えられます。タネイ寺院遺跡は、19世紀後半にフランス人考古学者らによって再発見されますが、1940年代までは密林の中にほぼ手つかずで残されていました。そして現在も、遺跡を構成する建造物は再発見された時の様相をよく留めています。

伽藍は三重の囲いをもつ長方形平面で、外周壁の東西面の中央にそれぞれ単層の門を設けています。その配置から、この東門がアンコール期における寺院の正門であったと考えられます。伽藍配置は他のアンコールの寺院にみられない独特なものです。伽藍中心部は外回廊と内回廊で二重に囲い、内回廊で囲われた中庭の後半中央部に寺院の中心施設とみられる高さ15メートルの中央祠堂が建っています。中央祠堂の正面に建つもう一つの塔状の祠堂(東祠堂)は、本来であれば内回廊の表門が位置する場所にあり、当初は門として計画したものを途中で祠堂に変更した可能性が考えられます。

東門は、上述の通りアンコール期の寺院正門と考えられますが、アンコールの他の寺院正門と比べて規模が小さく、簡素な形式をしています。外壁は装飾豊かで、各壁の外端にデバター(女神像)、中央部に盲窓を配し、東西南北の各ペディメントには仏教の経典から引用した場面を彫刻しています。中でも東面(正面)ペディメントの「甘露水陀羅尼」(餓鬼に甘露水を施す観音)は、アンコールの他の寺院にはみられないもので、当寺院創建の由来を示しているのかもしれませんが。

東門は小規模かつ構造的にも簡素で、強く目を引く建物ではありませんが、大きな改造がなく、現存する構造体のみならず崩落した部分の各部材が現地によく残されており、アンコール期の建築技術を伝える貴重な存在といえます。

Being a Buddhist temple which is in ruins at present, Ta Nei is located in the northwestern vicinity of the East Baray, the ancient reservoir that is now without water. Judging from the architectural style and decorations of the temple, it is assumed to be built between the late 12th and the early 13th century, during the reign of King Jayavarman VII. After rediscovered in the late 19th century during an archaeological investigation by French pioneers, the ruins had remained almost untouched in the middle of the forest until the 1940s. Even today, the structures of the remains are still in a condition and an atmosphere relatively unchanged.

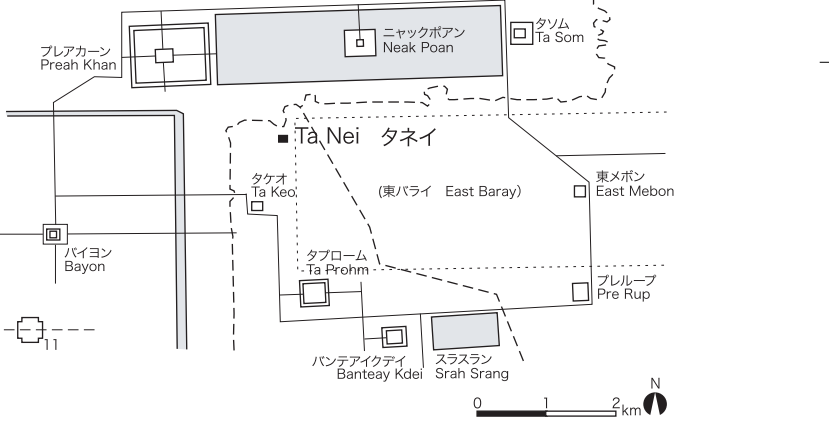
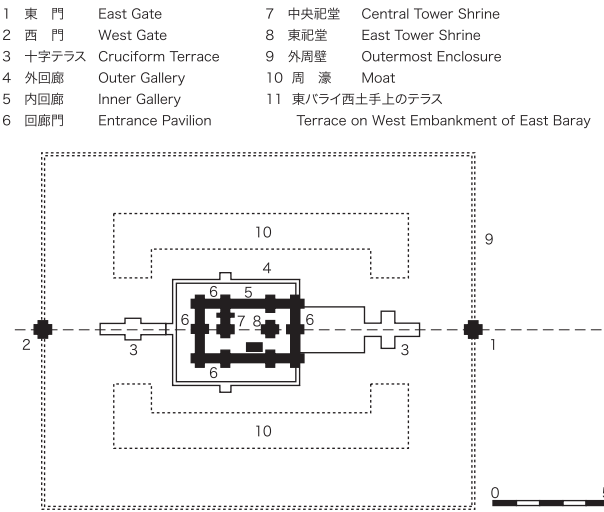
Precincts of the temple facing to the east, arranged in a rectangular plan, consist of three enclosures. The Outermost Enclosure wall has two gates which are located in the middle of the east and west sides. Among those, the East Gate is considered to be the main access point during the Angkor period. The layout of Ta Nei features a unique pattern compared to that of other Angkor temples. The main complex located in the central part of the temple is surrounded by inner and outer galleries. Inside the Courtyard surrounded by the Inner Gallery, there stand two tower shrines. The Central Tower Shrine, which is a 15-meter-high building seems to be the main shrine of the temple. In front of this building, another tower shrine stands in the position where the front gate of the Inner Gallery of the usual Angkor temple is located. It is assumed that this East Tower Shrine may have been initially planned as a gate and was turned into a shrine later.

Although it is considered that the main approach to the temple was from the East Gate, its structure is smaller and simpler compared to the main gate of other major temples in Angkor. Nevertheless, the exterior of the structure has a rich decoration with various carvings, such as a Devata (female divinity) figure on the outer edge, a false window in the middle of each external wall, and Buddhist mythological scenes on the pediments of four protruding surfaces. Especially, the carving on the east (front) pediment, depicting “Avalokitesvara (Lord of Compassion) giving amrta (nectar of immortality) to pretas (hungry ghosts)” is very remarkable that is not seen in any other temples in Angkor. This distinctive carving may suggest the purpose of establishing the temple.

Although the East Gate is a simple structure which is not very eye-catching, its original components, including those of collapsed parts, still remain unmodified and almost without lack until present. The building thus conveys the ancient architectural techniques of the Angkor period.



左上:内回廊内に建つ中央祠堂(手前)と東祠堂(奥)
右上:樹木に覆われた中心部の景観(内回廊北面)
左下:東門東面(正面)ペディメントの彫刻
右下:修復前の東門(北東から)
Upper left: Central Tower Shrine (front) and East Tower Shrine (back) in the Courtyard
Upper right: Densely forested landscape of the central area (north side of the Inner Gallery)
Lower left: Carving on the east (front) pediment of the East Gate
Lower right: East Gate before restoration (northeastern view)



タネイ寺院の位置(右)と伽藍配置(左)
Location (right) and site plan (left) of Ta Nei Temple



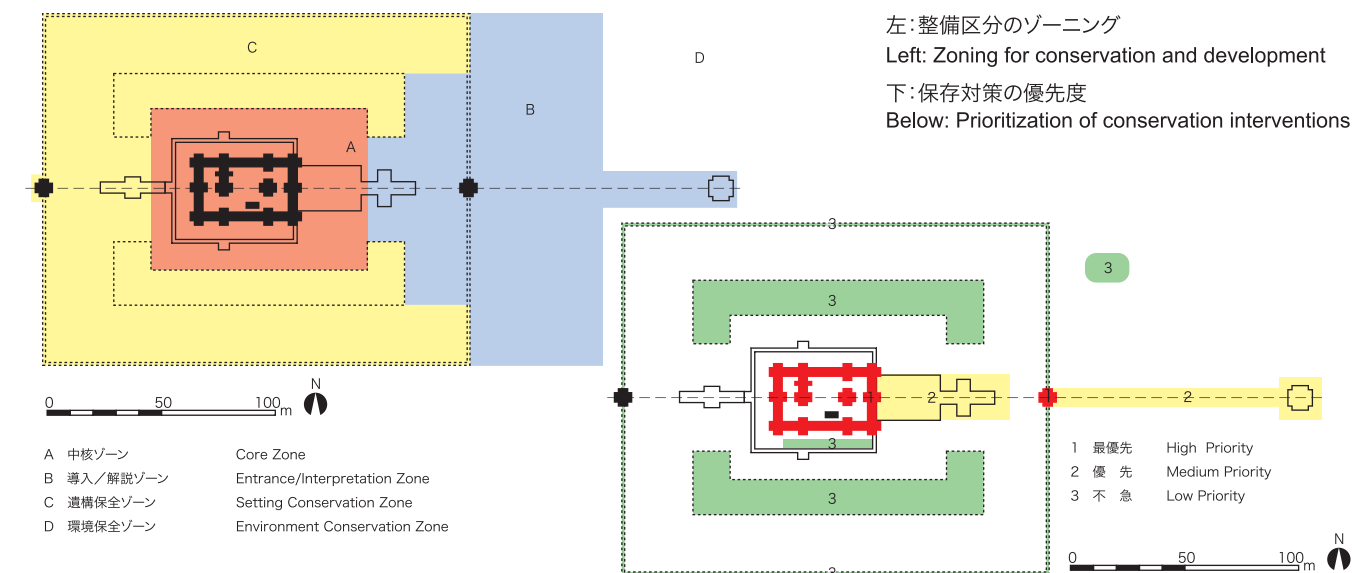
保存整備計画

タネイ寺院遺跡の保存整備計画に関する検討は2014年から始まり、計画の基本方針を決定するためのワークショップが東文研とアプサラ機構の共同で開催されました。そして、このワークショップでの合意事項に基づき、東文研とアプサラ機構は2017年にタネイ寺院遺跡保存整備計画を取りまとめました。

同計画では、実施すべき保存整備の方向性に応じて遺跡内を、A.中核(現状保存)ゾーン、B.導入／解説(整備・展示)ゾーン、C.遺構保全ゾーン、D.環境保全ゾーン、にゾーニングしました。また、保存整備の実施にあたっては、ゾーニングに加えて、1. 学術的調査、2. 文化遺産保護、3. 持続的整備、の3つの事業を並行的に進めることとしています。

東門は、同計画において遺跡東側のアクセスを改善し、寺院としての正面性を回復することを意図した「導入／解説ゾーン」における中心的な建造物として、その健全性をいち早く取り戻すことが求められています。また建物の現状を分析した結果、文化遺産保護の観点から、解体を伴う本格的な修復を実施すべき優先度が非常に高いと判断されました。

同計画の基本的な内容は2017年6月に開催されたアンコール遺跡救済国際調整委員会第28回技術会合において報告し、承認を得ています。



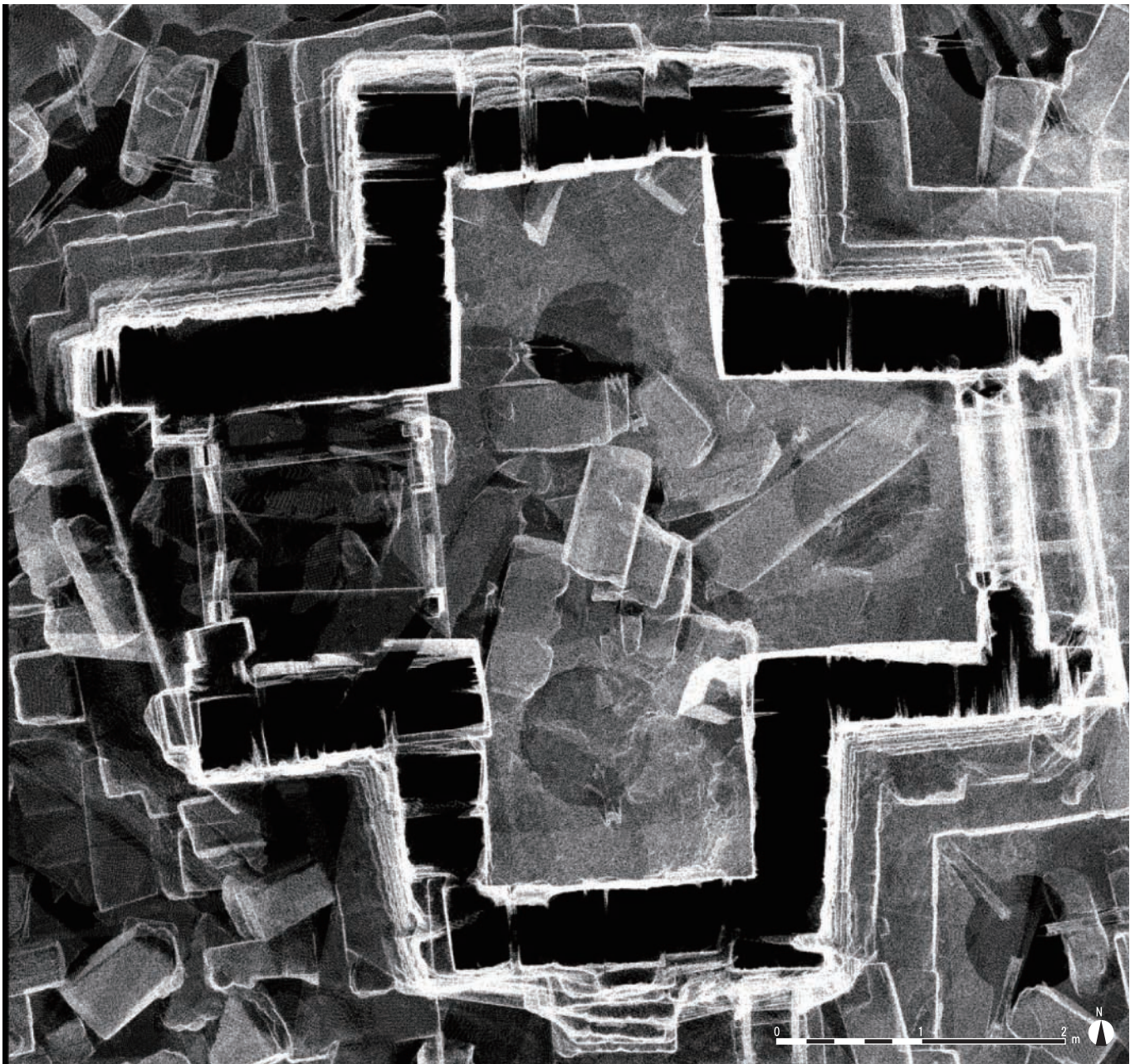
Conservation and Sustainable Development Plan

The study on the conservation and sustainable development of Ta Nei Temple was started in 2014, and a workshop was jointly organized by TNRICP and APSARA, with the purpose of determining the basic policies of the project. Based on the outcomes of this workshop, Conservation and Sustainable Development Plan of Ta Nei Temple was drawn up in 2017.

The site is divided into the following four zones, for each of which interventions of different directions are proposed: A) Core Zone (conservation area where the existing condition should be maintained), B) Entrance/Interpretation Zone (presentation/guidance), C) Setting Conservation Zone, D) Environment Conservation Zone. It is also proposed to perform relevant activities simultaneously in the following interrelated aspects: 1) Investigation (academic research), 2) Heritage conservation, and 3) Sustainable development.

The plan proposes the East Gate to be restored urgently, since it is expected to be serving as the main building in the Entrance/Interpretation Zone, in which the original approach way will be recovered and the readability of the original front side of the temple will be improved. The examinations were conducted to identify current condition of the building, and based on the results of such analysis, it was determined from the viewpoint of conservation that a full-scale restoration with dismantling is required to make it into structurally sound condition.

The outline and the basic policy of the plan was reported and approved in the 28th Technical Session of the ICC-Angkor in June 2017.

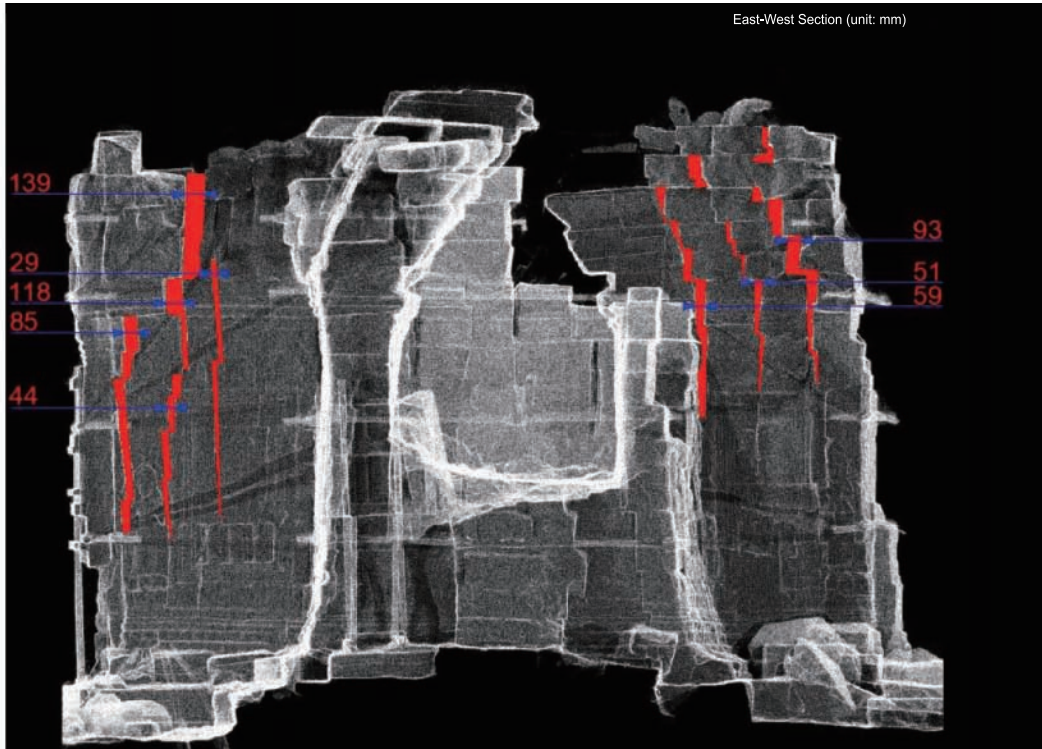
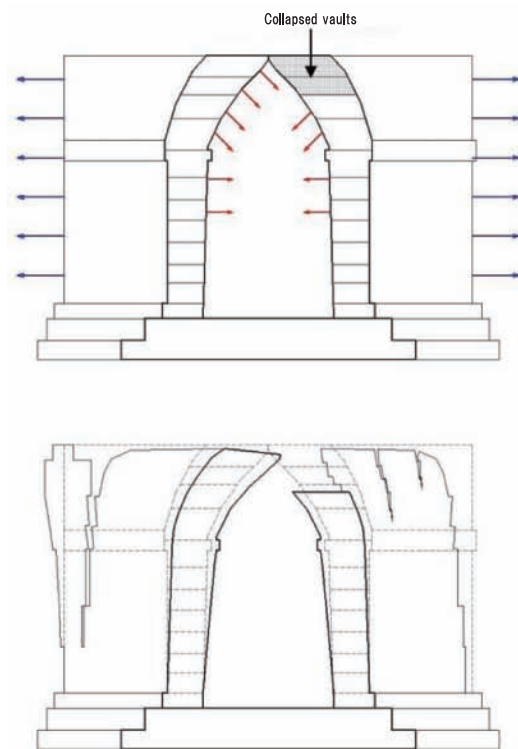


上：レーザー計測平面図

下：レーザー計測図を用いた破損調査

Above: Horizontal image generated from laser scanning data

Below: Analysis of structural deformation by using laser scanning



東門の修復 Restoration of the East Gate

2019年、保存整備計画に基づいて東門の修復を開始し、アプサラ機構との協働のもと、以下に示す工程で解体作業を進めました。

はじめに事前調査として、現状の記録作業を、三次元レーザー計測、写真測量、実測および現状図面の作成、の3種類の方法で行いました。建物周辺の散乱石材の一部には、以前に移動・整理された様子が確認できることから、20世紀初頭にフランス人修復家が何らかの手を加えた可能性が考えられます。

その後、2019年9月9日から屋根の解体に着手しました。解体する層ごとに平面図を作成し、各石材に番付を施したうえで、クレーントラックを使用して頂部から順に石材を取り外しました。屋根の解体(上から5層目まで)は9月20日に完了し、壁の解体に着手する前に、建物内に堆積した崩落石材を含む土砂や蟻塚、樹根等を除去しました。回収した石材は約70個で、屋根やペディメントの部材が大半を占めることから、経年により自然に崩壊した様子が窺えます。

屋内堆積物の除去と必要な記録作業の完了後、10月16日から壁の解体に着手し、11月4日に壁最下層の石材(第16層)を残して解体を完了しました。解体に伴う調査を通して、樹根などが石材の目地に入り込み、建物が変形する一因となっている様子が確認できました。

記録作業は解体作業と同時進行で行い、各層平面の写真測量に加えて、建物外観の定点撮影を行いました。解体後の石材は部位または層位ごとに建物の近傍に仮置きし、英語およびクメール語で調書を作成して、法量、状態、断片や破片の接合状況、彫刻の有無等の情報を記録しています。

基壇および床面には不同沈下が認められたことから、壁の解体の完了後、基壇地中部の構造を把握するための発掘調査および地盤調査を12月2日から20日にかけて行いました。

Based on the Conservation and Sustainable Development Plan, restoration of the East Gate started in 2019. Dismantlement of the structure has been carried out in collaboration with APSARA in the following process:

First of all, existing situation of the structure was recorded with 3D laser scanning, photogrammetry and architectural documentation. It was confirmed at this stage that some of the scattered stones around the building had been moved or rearranged on the site at a certain time, which was assumed to be during the early 20th century by the French conservators.

Dismantlement of the roof started on September 9, 2019. Before dismantling, each layer was documented via photogrammetry and every stone was marked with indentification code which was also reflected on the architectural drawings. After the documentation work finished, each layer was carefully dismantled starting from the top, by using a crane truck. When the roof dismantlement (up to Layer 5 from the top) was completed on September 20, the debris inside the southern part of the gate, constituted by collapsed stones, anthills, soil, and tree roots were cleaned. Being roof and pediment members, approximately 70 blocks were collected from inside this debris, which were considered to have collapsed naturally over time.

After the cleaning and documentation works, dismantlement of the wall was started on October 16 and was completed on November 4 leaving the lowest layer of the wall (Layer 16). It was confirmed during this process that tree roots penetrating into joints between stones had caused the building deformation.

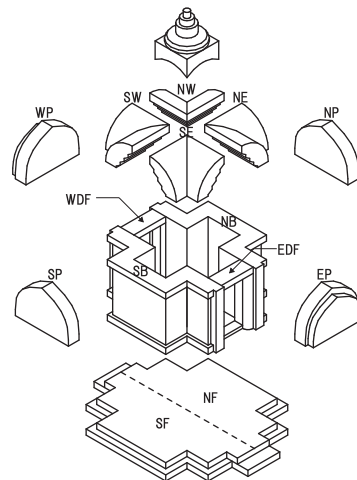
Documentation was also conducted simultaneously with the dismantling process. In this regard, overall progress of the work was documented via fixed point photography, in addition to the photogrammetric records of each layer. The dismantled stones were temporarily placed in the vicinity of the building, being grouped layer by layer, and such information about each stone as, dimensions, physical conditions, presence of carvings, etc. were recorded both in English and Khmer languages.

As the unevenness of the floor and the base structure was observed, the archaeological and geotechnical investigations were conducted during December 2–20 after completion of the wall dismantlement, aiming to understand the condition of the base structure.



上： 屋根の解体作業
中左：壁の解体作業
中右：基礎構造の発掘調査と地盤強度試験
下： ボールカメラを用いた写真測量

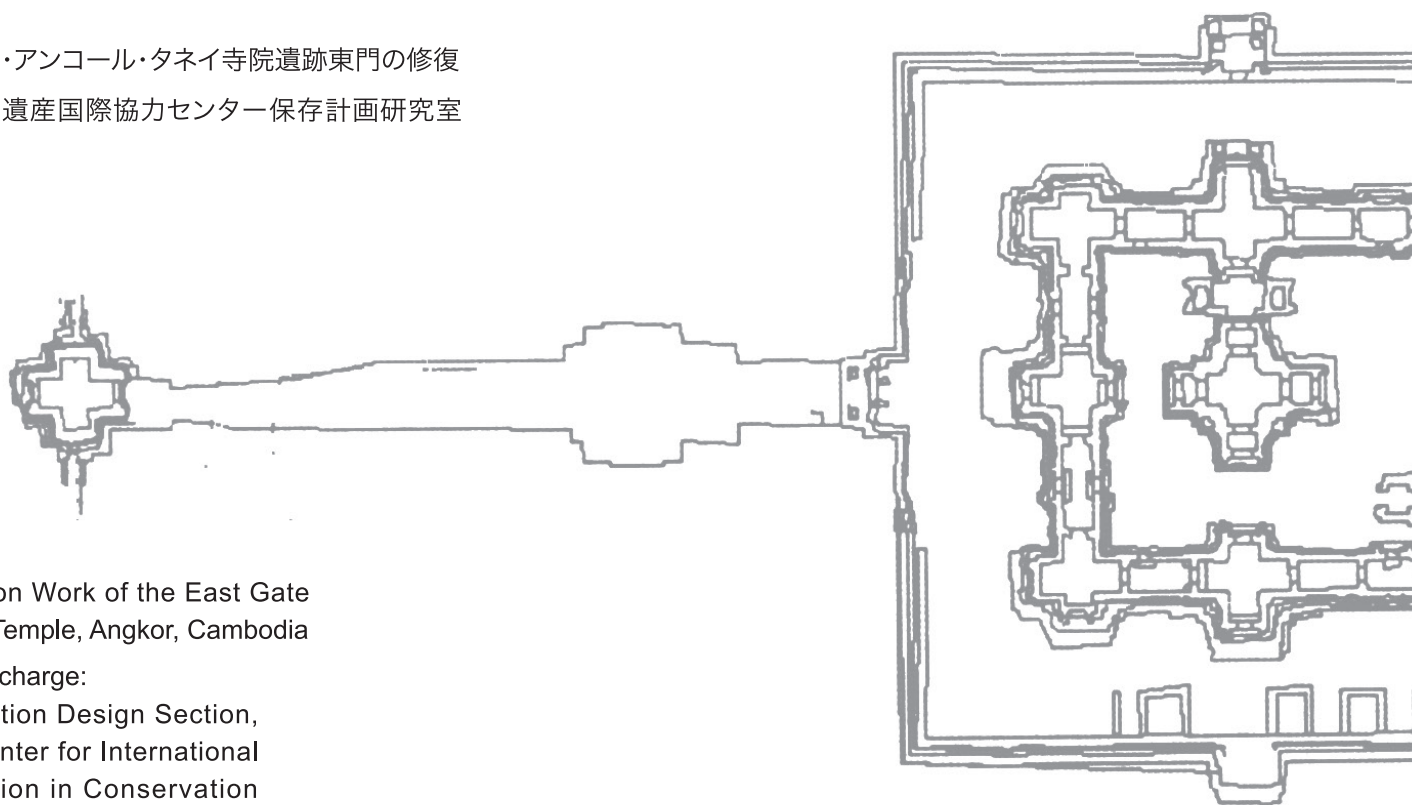
Above: Dismantlement of the roof structure
Middle left: Dismantlement of the wall structure
Middle right: Archaeological research and soil testing of foundation structure
Below: Photogrammetry with high pole camera



解体石材の番付区分
Stone numbering system



カンボジア・アンコール・タネイ寺院遺跡東門の修復
担当:文化遺産国際協力センター保存計画研究室



Restoration Work of the East Gate
of Ta Nei Temple, Angkor, Cambodia
section in charge:
Conservation Design Section,
Japan Center for International
Cooperation in Conservation

アンコール・タネイ寺院遺跡を対象とした、当研究所と
アプサラ機構との協力事業は、ほぼ20年にわたる長い
歴史を有しています。

ここでは2019年に始まった東門の修復に関する協力
成果の一部を紹介しました。2020年も引き続き、構造的
問題の改善を含む東門の修復を進めるとともに、アンコ
ール遺跡群における適切な修復事業のあり方を模索し
ていきます。

The cooperation between our institute and APSARA
regarding Ta Nei Temple in Angkor has a nearly 20 year
history.

In this pamphlet, some of the cooperation
results on the restoration of the East Gate which started
in 2019 are introduced. In 2020, we continue working
for this restoration project including the improvement
of its structural problems, as well as to establish an
appropriate way to conserve the Angkor monuments.

東門内部の崩落石材の下から発見されたロケシュバラ(観音菩薩)彫像頭部の三面図(アプサラ機構提供)

Head of Lokeshvara (Avalokitesvara) discovered beneath the collapsed stones inside the East Gate, trihedral photography (by courtesy of APSARA)

